THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXXII. No. 17. Whole No. 1,559. | NEW YORK, MONDAY, APRIL 24, 1905. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 42 Pine Street, New York.

Telephone.—2996 John.

The American News Company, Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them. All payments to be made in advance. Single copies, 10 cents.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $5 (£1—25 francs).

Remittances should be made either by post office order, express money order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Collections are invariably made directly from this office for subscriptions advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICES—

Respecting the Official Work of the American Gas Light Association..... 641

Twenty-eighth Annual Meeting, Western Gas Association..... 641

EDITORIALS—

Briefly Told..... 642

The President of the Ohio Gas Light Association Takes the Floor—Notes.

Twenty-first Annual Meeting, Ohio Gas Light Association—Report of Proceedings—Continued from Page 610..... 642

First Day, Afternoon Session—Progress Department, Edited by Mr. Irvin Butterworth—Discussion—Report of Committee on Flow of Gas in Pipes, Mr. J. D. Shattuck—Discussion.

*Moving a Station Meter in Winter, by Mr. G. B. Leland..... 650

The Fleming Cymometer..... 651

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 652

An Answer to Mr. W. B. Miller—And a Reply to Mr. John P. Tompkins—A Hint from Hamburg, Pa.—Piping Times at Eau Claire, Wis.—Something of Interest from Stevens Institute of Technology—Will the Pynchon Land and Construction Company Obtain a Charter?—Cheaper Gas for Springfield, Mass.—Mr. Richard Schaddelee's New Duties—Mr. C. H. Wheeler Goes to Appleton, Wis.—Death of Mr. W. H. English—Mr. John Corscot Doubts It—The San Angelo (Tex.) Gas Company—Annual Report, Holyoke, Mass.—An Interesting Installation—And Other Items.

The Market for Gas Securities..... 654

[OFFICIAL NOTICE.]

Respecting the Official Work of the American Gas Light Association.

AMERICAN GAS LIGHT ASSOCIATION,
SECRETARY'S OFFICE,
530 Broadway, N. Y., Dec. 13, 1904.

To the Members American Gas Light Association: As there seems to be some misunderstanding respecting the standing of the official management of the Association, members will please note that the undersigned is the Secretary of the Association, and that Mr. A. E. Forstall is carrying forward the work of the Practical Class. All correspondence in connection with the Practical Class should therefore be addressed to Mr. A. E. Forstall, 58 William street, and all other matter pertaining to the Association to MR. GEORGE G. RAMSDELL, Secretary, at the above address.

[OFFICIAL NOTICE.]

Twenty-eighth Annual Meeting, Western Gas Association.

WESTERN GAS ASSOCIATION,
OFFICE OF SECRETARY, NEW ALBANY, IND.,
April 17th, 1905.

To the Members of the Western Gas Association: The twenty-eighth annual meeting of the Western Gas Association will be held at the Auditorium Hotel, Chicago, May 17, 18 and 19, and will be called to order by the President, Mr. O. O. Thwing, of St. Louis, Mo.

The Auditorium Hotel has also been selected as headquarters, the rates in which are as follows: European plan: Rooms, single, without bath, $2 to $3; single, with bath, $3.50 to $4; double, without bath, $3 to $4; double, with bath, $5 to $6.

The following papers will be presented:

"The Practical Enrichment of Low Candle Power Coal Gas with Benzol: Its Convenience and Advantages," by Mr. Fred. B. Wheeler, Detroit, Mich.

"Cement Joints," by Mr. Jacob D. von Maur, St. Louis, Mo.

"The Ideal Corporation," by Mr. N. D. Cochran, Toledo, O.

"The Prevention of Stoppages in Services, Meters and House Pipes in Cold Weather," by Mr. Irvin Butterworth, Grand Rapids, Mich.

"The Gas Laboratory," by Mr. W. B. Calkins, Fairmount, Va.

"Acetylene," by Mr. J. M. Morehead, Chicago, Ills.

"The Rotary Blower and Exhauster: Its Construction, Efficiency and Application," by Mr. George C. Hicks, Connersville, Ind.

"Kansas Oil," by Mr. K. M. Mitchell, St. Joseph, Mo.

"Texas Oil," by Mr. Thos. D. Miller, New Orleans, La.

"Report and History of the Western Gas Association's Exhibit at the World's Fair," by Mr. F. H. Shelton, Philadelphia, Pa.

"Experience as an Exhibitor at the World's Fair," by Mr. O. N. Guldlin, Fort Wayne, Ind.

A paper (subject not given) by Mr. B. E. Chollar, Kansas City, Mo.

"Wrinkle Department," edited by Mr. W. A. Baehr, St. Louis, Mo.

A short topic on the "Use of Tar as Fuel in Bench Firing," by Mr. F. C. Sherman, New Haven, Conn.

Reduced rates on the certificate plan have been obtained from the following Passenger Associations: Central Passenger Association, Western Passenger Association, Trunk Line Association, Southeastern Passenger Association, New England Passenger Association, excepting the Eastern Steamship Company.

The territory embraced by the above associations is located in all the States east of the longitude of Denver and Cheyenne, excepting Texas, Oklahoma, Indian Territory, Arkansas and the southern half of Missouri. Persons attending will obtain from railroad agent at starting a certificate stating that full fare has been paid to Chicago for the purpose of attending the meeting of the Western Gas Association. These certificates are to be given to the Association's Secretary, who will make proper indorsement, turning them over to a representative of the Passenger Association who will be present, and from whom members will obtain them upon the payment of 25 cents. This will enable the holder to purchase a return ticket at one-third the regular rates.

Going tickets can be purchased from May 13th to May 17th, and will be good returning, from May 18th to May 22d.

Rates are obtainable by all who may attend the Association meeting

LIBRARY OF CONGRESS APR 25 1905 SMITHSONIAN DEPOSIT.

regardless of membership. Persons not living in the above territory are advised to purchase tickets to nearest point within said territory, and from there purchase on certificate plan a ticket to Chicago.

The local Committee of Arrangements is providing a banquet, to be served at the Chicago Athletic Club, Thursday evening, May 18th.

An invitation is cordially extended to members of other Associations to be present and take part in the discussions.

Membership blanks will be mailed to members, and they are urged to use their endeavors in securing new members from among their immediate associates. JAS. W. DUNBAR, Secretary.

BRIEFLY TOLD.

THE PRESIDENT OF THE OHIO GAS LIGHT ASSOCIATION TAKES THE FLOOR.—The following letter from Mr. Donald McDonald, as President of the Ohio Gas Light Association, is herewith given that publicity which its writer evidently hoped for:

OHIO GAS LIGHT ASSOTIATION,
PRESIDENT'S OFFICE,
LOUISVILLE, KY., April 18th, 1905.

To the Editors AMERICAN GAS LIGHT JOURNAL: In your issue of April 17th you speak of the action of the Ohio Gas Light Association in making possible the joint meeting with the Western as a "Set of emotional resolutions." If the membership of the Ohio *was* composed of women or children, I do not think that they would consider this expression offensive; but, as the majority of the members are equipped either with bald heads or grey hair, I think the way in which you describe their action is undoubtedly belittling, and I think it my duty, as President of that Association, to call your attention to it.

Your paper goes to almost every gas company in the United States. It professes to report all that occurs of interest to gas men. If, in addition to reporting facts, you care editorially to oppose or advocate any particular policy, no one has a right to complain; but when you describe the deliberate action of several hundred middle-aged men as "emotional," without any editorial giving your reason for considering it unwise, I think you have stepped a little beyond the field which your paper professes to occupy, and has occupied. Very truly yours,

DONALD MCDONALD,
President Ohio Gas Light Association.

[The above amazing communication is not emotional; it is hysterical. The matter objected to, as per the indictment made, had no reference to women or children, or to members "equipped either with bald heads or grey hair;" it simply had to do with things that might have an effect on the attendance at the forthcoming Chicago meeting of the Western Gas Association. We have no right to speak definitely as to President McDonald's knowledge regarding the meaning and application of words, but as one of the synonyms given in "Webster's Unabridged" for the word emotional is sensational, we respectfully declare that President McDonald's communication hereinbefore is at once hysterical and sensational. We further fear that it (the communication) will not receive the full appreciation of the non-emotional members of the Ohio Association. It (the communication) lacks dignity, and is devoid of repose. In so far as the JOURNAL'S relations to the Ohio Gas Light Association are concerned, as compared with those rendered it by its present President, the records of the Association will reveal. As far as the JOURNAL'S future is concerned; well, it looks that President McDonald may not waste his time over thinking about it.—EDS.]

NOTES—

WITH exceeding regret we chronicle the death of Mrs. Marian Julia Green, the estimable wife of Colonel James Green, of St. Louis, Mo., who passed away, at her home in that city the evening of the 14th inst. Deceased was one of the best known and well esteemed women of St. Louis, and many an humble one of its residents will miss her kindly aid. She is survived by her husband, a son and daughter and a sister.

MESSRS. H. M. BYLLESBY & COMPANY have been appointed managers and engineers of the gas and electric properties of the San Diego (Cal.) Consolidated Gas and Electric Company, of San Diego.

A CORRESPONDENT in Cincinnati, O., writing under date of the 15th inst., says that at least $500,000 will be spent in improving the plants now under control of the corporation of the Hamilton Gas and Electric Company, which is a merger of the Hamilton Gas and Coke Company, the Hamilton Electric Light Company and the Hamilton-Otto Coke Company. The merging was made dy Messrs. W. R. Todd & Co. The capital of the concern is: Preferred stock, $60,000; common stock, $1,000,000; bonds, 5 per cent., $1,000,000.

[Report of Proceedings.—Continued from page 610.]

TWENTY-FIRST ANNUAL MEETING, OHIO GAS LIGHT ASSOCIATION.

HELD AT PITTSBURGH, PA., MARCH 15, 16 AND 17, 1905.

FIRST DAY—AFTERNOON SESSION.

The President introduced Mr. Irvin Butterworth, of Grand Rapids, Mich., who, as Editor of the

PROGRESS DEPARTMENT,

presented the following budget:

As Editor of your Progress Department, I submit below my third annual report of technical and mechanical improvements and progress in the manufacture and distribution of gas. I regret that on account of press of other work I have been unable to make this report as complete and as valuable as it should be.

Considering the fact that the gas business is now one of the most venerable of our manufacturing industries, the manufacture and distribution of gas having been carried on as a business for over 100 years, it is rather surprising to find it still so vigorous, and so alert and active in self-improvement along technical lines. While many of our progressive engineers realize that there is still much room for improvement in the art and technique of gas manufacture and distribution, yet our industry is not behind others in the march of progress, but has quickly adapted itself to changed conditions as they have arisen and made marked technical advancements each year. That technical improvements of any importance, either in single apparatus or in the aggregate, have been made in the gas business during the past year would probably not occur to the average busy gas man, as the year has apparently been a quiet one in these respects; and yet a little investigation discloses that in many directions notable progress has been made and that the industry as a whole has made much technical advancement.

I have been unable to obtain a classified list of the patents issued during the past year in this country pertaining to the gas business, but in England the gas patents issued during the year, and that have been deemed worthy of special notice, number 298, as against 310 in 1903, 240 in 1902, and 259 in 1901. This indicates that gas invention has fully held its own during the year. In this connection I am obliged to admit, as the result of my work in gathering data for these reports, that Europe, possibly England alone, produces a greater number of valuable inventions and improvements pertaining to the gas industry than does the United States. While this is true as to the technical side of our business, I am inclined to think that in our economical methods we excel our friends across the water. The province of this department limits my report to a consideration of purely technical and mechanical matters, but I may be permitted to make the following general observations:

On account of the great use of incandescent burners, the present tendency the world over is toward gas of lower candle power. In German cities the open flame burner has practica lly disappeared, and the candle power of the gas in some places is as low as 10, and even 8. Before a Parliamentary Committee on Gas Testing in London last summer, Professor Lewes, the well-known authority in such matters, stated "that under existing conditions the supply of gas of a high candle power was a waste of money, and it was manifestly unfair that the gas consumer of average intelligence, who was willing to utilize the benefit given by the incandescent mantle, should have to pay for a quality of gas only rendered necessary by the inertia of those who decline to advance with the times. His own opinion was that London should have a uniform gas supply of 12-candle power coal gas." (*Gas World*, Sept. 10, 1904.) The present candle power in London is 14.

The great International Gas Exhibition held at Earl's Court, London, last December, was probably the most notable feature of the gas industry during the past year. It was a decided and brilliant success and has undoubtedly been a great stimulus to both the technical and the commercial advancement of the industry in Great Britain, and in fact throughout the world.

A significant and interesting action of the French Gas Association during the past year was the offering by them of a series of cash prizes, open to the world, for improvements in the following: (1) Apparatus for making or using gas; (2) for a new incandescent burner for ordinary use; (3) for improvements in automatic gas lighting; (4) for gas heating and cooking appliances; (5) for appliances using coke; (6) for artistic gas fixtures; and (7) for the best papers on subjects of interest to the gas industry.

A hopeful sign of the times for the technical future of the gas industry is the beginning that has been made in co-operative association work between English and American gas engineers. The recognition of the gas industry by the authorities of the Louisiana Purchase Exposition, and the movement toward the federation of Gas Associations in the United States, are also indicative of the progress of our industry.

I will now give, more or less in detail, some of the special improvements that have been made during the past year in gas apparatus, appliances and processes.

Manufacturing Department.

Charging and Discharging Machinery.—During the past year, as during the preceding one, there has been great activity in the perfecting of existing types of charging and discharging machinery and in the invention of new types. In fact, they are becoming so numerous that I shall not attempt to enumerate or describe them. The idea is so attractive that every inventor and engineer seem to be taking a hand at it, most of them within the past year, but none of the machines thus far, so far as I know, have been brought out in this country. The success of machine drawing and charging is, of course, fully demonstrated. Besides those machines that work in straight lines or with a reciprocating motion, the rotary or turbine type of projectors is very much in evidence, and it is impossible to tell, at this stage of the experience, which type will ultimately prove the better. Enough progress has been made to indicate the probability that charging and drawing by hand will soon be a thing of the past, excepting in very small works. Several works in this country now employ charging or discharging machinery, or both. In New York and Indianapolis the De Brouwer projector is used, the De Brouwer ram, for pushing coke out of through retorts, being also in use in Indianapolis. The De Brouwer machines are in use in 21 plants in England (November, 1904). A ram is now generally used for pushing coke out of through retorts, and several makes of machines now introduce the coal and push out the coke at one stroke, the front end of the coal trough or scoop constituting the pushing ram. This sort of machine, now in successful use in Lowell, Mass., performs the dual operation for one retort in a very few seconds. A machine is in use in the Beckton gas works, London, that throws 600 pounds of coal into a 20-foot retort in 15 seconds and discharges the coke in 11 seconds. Another machine on the rotary principle, somewhat like a MacKenzie exhauster, makes 80 revolutions per minute, throwing 900 pounds of coal into a 20-foot retort in 20 seconds, at a velocity of 22 miles per hour.

Coal and Coke Conveyors.—There has been considerable progress along the line of gas works conveying machinery and many of the larger gas works in this country have equipment of this character. One concern is now making a specially designed coke conveyor, consisting of a steel trough with cast iron removable bottom plates, and side guides and chains having wearing blocks of cast steel, the combination of iron and steel reducing friction and wear to a minimum. Belt conveyors for bringing coal from the storage bins to the retort house are also in use in this country, as are also pivoted bucket conveyors. Bucket conveyors of various types are beceming more popular. The man-trolley and grab-bucket systems for unloading coal from cars and boats have been improved during the year. Hot coke conveyors are coming into further use and are being rapidly developed in various forms, such as grids, gravity buckets, etc. At Ilford, England, experiments are being made in moving hot coke from the retort house by blowing it out through a pipe by means of steam, and a patent has been obtained covering this system. A similar experiment was conducted at Denver about two years ago. A novel form of conveyor has been brought out in England, consisting of a movable trough supported on inclined spring legs, the trough being jerked backwards and forwards by a small countershaft and crank. Systems of telpherage are being constantly improved.

Benches and Retorts.—What might be called the double retort house has been designed in this country, contemplating two parallel stacks of troughs, with just sufficient clearance space between them for the operation of a combined charging and discharging machine, the result being a retort house of greater generating capacity per square foot of ground space than any other form of construction affords. Two or three other forms of improved retort house construction are being exploited in England, particularly those contemplating producer gas firing. Outside producers have been installed at the new Provan works, Glasgow. Efforts are being made to improve the quality of fireclay goods entering into bench construction. Retort manufacturers claim that "hurry orders" are the greatest foe to the best quality of retorts. One English manufacturer has brought out a corrugated flue regenerator. Another concern has made an improvement in bench flue walls that is said to lessen the liability of short-circuiting between the waste gas and secondary air passages. A baffle system of regenerators has also been brought out that is said to be a decided improvement, in that it permits of better control of heats and simplifies the setting of retorts. A new automatic regulator of the secondary air supply is now in use in Germany. It also serves as a chimney draft regulator. Undoubtedly the greatest interest in carbonizing plant is just now centered in the matter of vertical or upright retorts. These were mentioned and described in my Progress Report of last year, and great activity has since been displayed in their development by engineers and inventors. The system is very attractive and promising, some engineers believing that it is destined to revolutionize carbonization methods. Two or three experimental working plants on this system are now being operated in England and Germany, and while gas engineers who are familiar with its working are not yet entirely satisfied with the results so far obtained, they still believe that it will have a great future. Negotiations are in progress for the erection of benches on this system in France, Germany, Russia, Holland and the United States. Dr. Bueb, of Dessau, has designed a vertical retort setting to be fired with producer gas from an isolated producer. It is claimed for the vertical system that both the quality and the yield of gas are increased and that most excellent coke is produced. Slack coal can be advantageously used and the distillation is continuous, thereby realizing the long-cherished ideal of gas engineers. It has recently been discovered also that under certain conditions, which probably can be maintained, no naphthaline is produced by this system.

The outlook for inclined retorts, in view of the increasing promise of the vertical system and of the remarkably rapid development and introduction of machinery for charging and discharging horizontal retorts, is indeed discouraging; and these competitive methods have sprung into prominence just as the inclined system was apparently about to be carried forward on a tidal wave of popular favor.

Other Odd Forms of Retorts.—Reference is made in Butterfield's recently revised book on "The Chemistry of Gas Manufacture" to a "revolving" retort, brought out by Yeadon and Adgie, and I understand that such retorts have been given a short trial in Europe.

The small through retorts, 20 feet long and 13 inches in diameter, set in 2 vertical rows of 5 on each side of the combustion chamber, installed a year or so ago at East Greenwich, have been given a further trial, but have not proved advantageous.

In the Munich gas works, large retorts or "cells," 3 in a bench and capable of holding 4,400 pounds of coal each, are being installed, it being the intention to employ 24-hour charges. In these benches the primary air will be preheated.

At Essen, Germany, Herr Blass has recently been experimenting in the distillation of coal by means of highly heated gas, using a form of vertical and jacketed retort for this purpose, the results of his experiments being quite interesting. A patent covering this method of carbonization was issued to Mr. Frederic Egner in this country in 1889.

The interesting method of auto-carburation proposed a year or two ago by Prof. Lewes, in which water gas is passed through coal gas retorts during carbonization, has been given another year's trial, particularly at the Mariendorf works at Berlin, but thus far without proving that the system is of much value.

Other Retort House Machinery and Apparatus.—An English pneumatic tool company has brought out a tool for removing carbon from retorts by hammers pneumatically operated.

A firebrick concern in this country has perfected an automatic arrangement for operating a movable platform serving as a solid floor covering the pits in front of semi-regenerative benches.

An American gas company has designed and put into use a power machine, provided with a hopper, for charging coal into bench furnaces; also a new scurfing device, which gives superior results.

An English firm has brought out a new carbonic acid testing device for use with generator furnaces, and still another English firm is marketing the "Ados" carbonic acid recorder, which "automatically ascertains and records upon a continuous chart the percentage of carbonic acid in the waste gases passing from any furnace." It is said to be simple and certain in its action and is in use in some European gas works.

There is also now said to be "a patent indicator for ascertaining the depth of coal and other materials stored in hoppers."

Some improvements are also claimed to have been made during the year, both in this country and in England, in tar burners for burning tar under benches or otherwise. One of these burners, of English make, is equipped with an air-inducing injector for atomizing the tar.

The "Fery" pyrometer has recently been brought out for measuring

the high temperatures by radiation. Other improvements in pyrometers have been made during the year, and recording pyrometers and recording econometers are now in use in gas works in Germany.

A new arrangement for dip-pipe seal regulation is being used in England, or at least quarreled about by various engineers, each claiming priority in the use or patenting of the arrangement.

An enterprising American firm is now manufacturing coke rake heads of malleable iron.

An English firm has brought out a new automatic steel-yard coal weigher, and still another has recently brought out a very superior mouthpiece door.

Water Gas Plants.—I cannot find that there has been much improvement in water gas apparatus and processes during the year, although promising experiments are now underway in certain directions. A new kind of water gas machine has recently been brought out in Chicago and has already been installed in one or two cities. An English concern has patented an interlocking gear for the valves of water gas machines; also, a "lifting" oil sprayer which saves itself from the destructive effects of the heat. A so-called methane hydrogen plant has just been erected by an English firm at the Truro gas works, having a modified generator, using either oil or tar, and producing a gas said to contain much less carbon monoxide than ordinary carbureted water gas. So-called auto-carburation is being adopted in one or two water gas plants in Germany, employing benzol for this purpose. An instrument called the "water gas cycle recorder" has been put upon the market in England, which is used as a check upon the workings of water gas plants. A new method of introducing the carburetor blast has recently been brought out in this country and is now in use.

Washers, Scrubbers and Condensers.

A very novel tar extractor has been brought out in England during the past year and progress has been made in the development of the general theory of tar extraction, particularly as regards the removal of so-called tar fog. There have been minor improvements on both sides of the water in scrubbing and condensing apparatus and systems, but nothing radical or important. The Louisville (Ky.) Gas Company has installed a new construction of vertical multi-tubular condenser, which removes the water of condensation at short periods; and a Scottish firm has produced an annular brush scrubber. One English concern has brought out a liquor turbine distributer for tower scrubbers, while another has produced a new and interesting apparatus designated as "a vaporizing condenser." At least one firm in this country is now prepared to build cyanogen and naphthaline extractors. The subject and practice of washing gas with absorbent oils, particularly tar oil distillates of various kinds, for the removal of naphthaline from the gas, have had a great revival during the year, particularly in England, and much quarreling has been going on as to who is entitled to credit for priority in the promulgation and practice of this method. There is no question, however, that much progress has been made in the use of this method for the removal of naphthaline from the gas. The gas scholarship students in the University of Michigan have, during the past year, given the subject of the formation of naphthaline a great deal of study and have added to our stock of knowledge on the subject.

Purification.

Progress in purification matters during the past year has been considerable, and chiefly in the direction of the purification of gas by the use of revivified ammoniacal liquor in closed vessels. Many experiments are being conducted along this line, with most encouraging results. In fact, the system is really now established and marks a decided advance in purification practice, although this method was exploited several years ago. In dry purification the introduction of the Jager grid system, which is fully described in the English "Gas Journals" of the past year, has brought about a great improvement in results, the duty of purifying material by its use being nearly doubled under average conditions. A system of purification is in use in Berlin, in conjunction with apparatus for the extraction of cyanogen, that in one works has rendered unnecessary any change of purifiers during the past 2 years. A gas engineer in this country has just patented a process for removing from gas sulphur compounds other than sulphureted hydrogen. However, in this connection it is interesting to note that the question of sulphur compounds in gas lighted rooms has recently been thoroughly and scientifically investigated in Europe, with the finding that under ordinary conditions there is no increase in the sulphur content of the air in gas lighted rooms over that of the outside air, but that on the contrary there is a decrease, due to the rapid purification by the walls and ceilings. This discovery has attracted considerable attention and comment. An English gas engineer has brought out a connectionless center valve, and there has been considerable progress in the development of dry joints or lutes for purifying boxes. A method for mechanically revivifying oxide has been brought out in Europe, in which the foul oxide is carried by power driven chains through a vertical tower containing a fan that blows air through the oxide as it passes. An American firm has brought out a safety dumping door for purifying boxes, in which the oxide is supported by a light hinged steel plate instead of resting heavily upon the dumping-door itself. Various improvements in purifying valves, 4 way and otherwise, continue to be made from year to year.

Station Meters.

The rotary meter mentioned in last year's Progress Report is making considerable headway, being now used in 150 towns in Great Britain. It is capable of measuring large quantities of gas, costs about half the price of an ordinary station meter, occupies a very small space and is not liable to suffer much wear or depreciation. It is accurate in its operation and is equally well adapted to either high pressure or low pressure gas. The principle of its construction is a fan-wheel, with vanes set at an angle of about 45°. I understand that it requires some adjustment, according to the quantity of gas which it is expected to register. The usual form of station meters has been improved during the year by the construction of a drum that will stand higher rates of speed than heretofore, and the further perfecting of tell-tale indexes. Proportional meters have been improved by the use of aluminum for such parts as are exposed to corrosion, and the removal of working parts, as far as possible, from the flow of a large volume of gas.

Gasholders.

A gas engineer in England has brought out a device for blowing the air out of the crowns of gasholders when being filled with gas after having been empty. An advance in the construction of large holders is marked in the building, now in progress, of a 15,000,000-foot holder for the Consolidated Gas Company, of New York city, which, when completed, will be the largest gasholder in the world.

Distribution Department.

Street Mains and Street Main Appliances.—So-called "Universal" cast iron pipe is coming considerably into favor. Its manufacturers are now making 12-inch and 14-inch sizes, and expect to add the 16-inch size during the coming year. High pressure drillers have been somewhat improved during the year, and so have tapping machines. One concern has made an improved service cleaner and has also produced a rotary drip pump. It has also put upon the market special high pressure gas cocks having ¼-inch openings through the plugs, or any other size desired by the customer. Another concern has brought out a gas leak indicator, based on the principle of the diffusion of gases, which is coming into use and giving good satisfaction. The same concern has brought out a pocket pressure gauge and a dry portable pressure recorder. The makers of pressure recording gauges are constantly bringing out new sizes, covering various ranges of pressure, etc. An Eastern main laying firm uses a 15-horse power electric motor for testing high pressure lines at 75 pounds pressure. A patent gas main stopper for 60-inch mains is in use in New York city, and one American manufacturer has made several shipments of gas main stoppers to England. Methods of laying high pressure mains have been somewhat improved. A German concern is making and selling "wool of lead" as a material for making pipe joints, claiming for it that it is well adapted to either high or low pressures and in every way a superior and inexpensive material for joint making.

High Pressure Distribution.—High pressure distribution has been adopted by several American gas companies during the past year, its success and advantages having been fully established. No marked improvements in means and methods pertaining to this system have, however, been reported.

Service Pressure Regulators.—A perfectly satisfactory service pressure regulator for low pressure distribution is still a desideratum of the gas business, although some progress has been made along this line during the year, and fairly good regulators can now be had. Gas companies generally are addressing themselves more than formerly to the attainment of good pressure regulation at consumer's premises, and, therefore, much work is being accomplished at the present time in the development of better service regulators. A gas meter has been brought out in England which contains a pressure governor in its interior, an idea which is as novel as it is promising. An American concern is now making a "mercury relief seal" for placing between the regulator and the meter, which automatically vents into the air any

gas that leaks past the regulator when the burners are turned off, thus preventing high pressure from reaching the meter and burners.

Pressure Boosters.—The use of fans and blowers in the holder outlet for increasing the pressure in the street mains during the hours of maximum consumption is growing throughout this country, and is being adopted to some extent in Great Britain. A steam turbine, direct connected to a fan blower, is one form of booster that is being used for this purpose, both here and in England.

Consumers' Meters.—Tools are being made by two meter manufacturers in this country for getting out a new style of 5-light meter which will have very large valves and openings, giving the meter a much greater capacity than the present 5-light meter and enabling it to take care of occasional overloads. The ultimate success of such a meter is, however, yet to be determined. The use of smaller diaphragms, not touching the meter case, is increasing. An English meter maker is now making his meter castings out of an iron alloy-coated tin plate that is said to be an improvement over materials generally used for this purpose. Efforts have been recently made in England to find some better membrane than leather for the construction of meter diaphragms, but thus far without success. A "discount meter" has recently been put upon the market in England by the inventor of the "rotary" station meter and constructed somewhat on the same lines that is very interesting and promising. It is about the size of a breakfast cup and is designed for measuring the gas supplied at a reduced price to gas fires, etc., near which it is to be attached, the amount of its registration being deducted from that of the regular meter which measures all the gas that is consumed on the premises. This meter is said to be entirely successful, and by its uniqueness, smallness and cheapness constitutes a radical departure in consumers' meters.

Prepayment Meters.—The use of prepayment meters in Europe continues to increase and has reached large proportions. For instance, in October last one of the gas companies in London had 156,000 of these meters in use, requiring the work of 116 men in the collection of pennies. The use of prepayment meters is also increasing in this country, but not nearly so rapidly as abroad. This, however, is partly due to the fact that American gas companies do not think it is to their advantage to push them. One concern in this country has brought out during the past year what it considers a burglar proof cashbox, the lock being placed inside instead of outside the box. An English firm has improved its prepayment meter valves by making them more nearly gastight, and most manufacturers have made some improvements. The maker of a prepayment meter attachment in this country has adopted a new safety valve for the prevention of accidents due heretofore to the gas going out and then coming on again. It consists of an auxiliary valve that allows a small quantity of gas to continue to flow after the main valve has closed. If after considerable length of time another coin has not been placed in the meter, this auxiliary valve also closes, shutting off all gas and eliminating all danger. An English manufacturer is making a "change-giving attachment" to overcome the inconvenience arising from the collection of a large number of pennies. When the dial shows that 6 pennies are in the box a 6-penny piece is dropped into the slot in place of them, the 6 pennies coming out for re-use. No more than 8 pennies can ever be in the box at one time. This results in the collection of 6-penny pieces only, instead of pennies.

Appliances and Burners.

Gas Ranges.—Gas ranges are still being gradually improved from year to year in many minor details. The use of asbestos as an insulating material is decreasing to some extent, the double body with air space now being considered preferable by many gas companies. One manufacturer has substituted a heavy galvanized steel rod in place of the cast iron supporting bar, and extra heavy pipe for the manifold as offering a greater thickness of metal for the gas cock threads. The burner orifices are now easily adjusted by means of so-called thimbles, and the burner cock handles do not project beyond the pipe and so are protected from being accidentally moved by the operator. The oven burners are removable by simply lifting them through the oven door without touching any bolts or linings. Swing doors, instead of drop doors, are coming somewhat into favor again, and at least two manufacturers have brought out safety pilot lights for oven burners which compel the operator to open the lower oven door before lighting the burners, thus preventing explosions. Most stoves are now equipped with die made and interchangeable oven linings, easily removable by hand. One concern has provided an extra air space underneath the bottom oven to insure a cool floor. Ranges with elevated ovens are coming rapidly into favor, several concerns now making them. One manufacturer has brought out a "protected broiling equalizer" for preventing the scorching and burning of meats, toasts, etc., and the firing of drip grease. Another manufacturer has decided to put his top burners nearer the top of the stove and to the bottom of the cooking vessel than heretofore, and is using a very heavy gauge steel in the construction of his range. Still another concern has brought out a burner that is claimed not to require adjustment for varying pressures, and also a scheme for preventing the formation of condensation in the air space between the inner and outer body. They have also devised a reservoir attachment for heating water. An English gas stove company has just brought out a hot water circulating attachment for gas ranges, so constructed as to utilize the waste heats of the products of combustion for preheating the water. Two or three English firms are also placing in the front doors of their stoves neat and effective "heat indicators" of several different kinds. Some novel forms of gas ranges have recently been brought out in England, equipped with safety devices and self lighting burners. One stove has baffle-plate top burners which vent the products of their combustion out of the room.

Instantaneous Water Heaters.—At least one or two new makes of these heaters have been placed upon the market during the past year in this country, although the tendency seems to be toward the circulating type of heater. One manufacturer has equipped his heater with a thermostat that automatically regulates the temperature of the passing water, and with a burner that shoots the gas flame from one side only, preventing back flashing. Another concern has equipped its heater with a "gas locking" device which renders it impossible to turn the gas on to the main burner without first lighting the pilot.

Circulating Water Heaters.—New kinds of circulating water heaters are being brought on the market each year, both by old and by new manufacturers. One concern has improved its heater during the past year by substituting a burner with an adjustable gasway. Many manufacturers have so constructed their water heater burners as to make them portable and readily removable by hand, and one concern has improved the pilot by running the tube directly into the heater itself, insuring ignition. Improved facilities have been added for cleaning the sediment out of the heater, and a burner has been substituted in which the gas can be used in either half of the burner alone, or in both halves simultaneously, as may be desired, lessening the liability of explosions and rendering the heater more flexible in its action.

Heating Stoves.—A gas heating stove was brought out last year in England that has an attachment at the side for regulating the admission of the air and gas independently, so that the stove can be quickly and properly adapted to different kinds of gas. Radiating and condensing stoves have also been recently put upon the market in England. Gas heated tubular steam radiators have also been brought out during the past year, both in this country and in Europe, equipped with automatic regulators for controlling the flow of the gas by the pressure of the steam generated. So far, they seem to be very popular.

Gas Ovens.—There have been some improvements during the year in large bread baking ovens, and an Eastern concern has brought out a new burner for large ovens for japan baking, etc., the air being supplied to the burner by a positive blower, and the gas being shut off automatically in case the air supply is interrupted. Heats as high as 800° F. are obtained.

A very promising self-regulating gas fire burner was very recently brought out in England, as was also a telescopic grate fire burner, adjustable to various sizes of grates.

Gas Flashlight Signs.—A gas flashlight sign, upon which its owners have been experimenting for the past 2 or 3 years, has been satisfactorily perfected and put upon the market, while other makes, constructed on different principles, are also being developed An English firm have recently patented what they call a "chameleon" sign, adapted to either gas or electricity, revolving color screens changing the color of the light somewhat like a kaleidoscope.

Lava Tips.—One manufacturer of lava tips is now plainly marking on each burner the quantity of gas that it will pass per hour and the pressure at which it will do so.

Gas Mantles.—Mantle manufacturers claim that mantles have been materially improved during the past year by the use of better methods and better materials; but while mantle complaints are much less common now than formerly, mantle experts confess that no marked improvement in the toughness and durability of mantles can henceforth reasonably be expected. An improvement in these particulars is apt to be accomplished only by a sacrifice of the light-giving qualities of the mantle. Single wire cap mantles are now protected by sheathing the wire support with a small stem made of refractory material; and an improved mantle support has also been brought out in Europe during the past year. Mantles made from ramie, a vegetable fiber, but recently

tried for this purpose, and said to be superior in many respects to cotton, are being further experimented with and are beginning to be used to a considerable extent. A new ramie mantle has been brought from Germany to England, the makers of which claim much for it in the way of increased durability and illumination. There has also been considerable improvement during the year in mantle making machinery.

Incandescent Burners.—Air-hole glassware has increased greatly in popularity during the past year, notwithstanding it is not conducive to a higher efficiency of the gas consumed; and an air-hole mica chimney has just been put upon the market. The use of ornamental fringes, especially those made of beads, suspended from the lower edges of dome shades, has become quite popular. A leading concern has recently brought out a new fixture that is very neat and especially adapted to the lighting of halls, small windows, living rooms, etc. It has also put upon the market a new "universal" burner that can be easily and quickly adapted to almost any kind of glassware and fixtures. Gas arcs, for both indoor and outdoor use, have been improved, one make being now equipped with an efficient governor. Arc lamps for factories have also been much improved during the past year, one style being especially dust-proof and having an all metal anti vibrator. Insurance companies are now forbidding the use of old style anti-vibrators in which rubber tubing was used. Several new forms of all metal anti-vibrators have also been recently brought out in England. Arc lamps are now being made in much more ornamental designs than formerly, and one for outside use has been improved by making it non-freezing. An improved storm proof lamp has just been brought out in England. One concern has replaced the wire and metal gauzes in the burner with a refractory material that resists the action of the heat, and the better kinds of burners are now being made with improved contrivances that make them more nearly "fool-proof" than heretofore. One manufacturer is putting out a combination of air-light chimney and holophane globe, by which the air is preheated before entering the holes in the chimney. Another form of chimney is also being introduced in this country that is said to considerably increase the efficiency of the gas, besides having other advantages. A novelty has just been brought out in England called the "under light" burner, which is said to combine the advantages of the ordinary incandescent burner with those of the inverted type. The mantle does not hang close around the burner, but a considerable space is left between them, the light from the inner side of the mantle being thus cast downwards. Another European firm has produced single burners that are said to yield a light of 30 candles per foot of gas at ordinary low pressure, and it has also produced a decided novelty in the shape of a burner with two mantles, one inside the other, the flame playing through the space between the two, and said to yield 30 per cent. more light per foot than the single mantle burners. A burner has recently been gotten out in New York which the patentee claims gives 50 per cent. more light per foot than any other. This claim will, however, doubtless be challenged by numerous makers of other burners. The result is said to be accomplished by a a construction that draws into the burner 7½ parts of air to 1 of gas, as against 5 parts with the ordinary construction. An incandescent burner using "petrol" oil has just been brought out; and in fact new burners and improvements in old ones are constantly being developed in all parts of the world, much progress undoubtedly being made along these lines.

One concern in England has brought out a "chain suspension" for gas lamps, consisting of an open link chain through which a metallic, flexible tube is passed to convey the gas. It gives the fixture the appearance of an electrolier and at the same time takes up both lateral and vertical vibration. This same concern has also brought out an arc lamp having no exposed screws, the lanterns being held from the interior.

A prominent English manufacturer of gas burners has perfected a gas adjuster for incandescent burners, which does not decrease the pressure at the point where the gas enters the mixing chamber, resulting, he claims, in increased efficiency. A new portico lamp has also been put upon the market in this country, having some novel and excellent features.

High Candle Power Lamps.—High candle power lamps have been further developed during the past year and are coming more and more into use, particularly in England, especially for street lighting and the lighting of large spaces and interiors. One or two English firms have brought out recuperative systems of high candle power lighting which are said to be very efficient, while other systems on the high pressure order are being perfected and established. Some of the finest of London's streets are being thus lighted much cheaper and better than could be done with electricity. One thousand candle power burners on this system are now quite common, and 2,000 and even 3,000-candle power lamps are also in use. Some of these systems bring the gas to a high pressure by means of electrically driven compressors, others by means of gas engines, and still others by water power. The practicability and applicability of these systems seem to be now assured. One system of intensive lighting is now operated by means of a dual by-pass arrangement that is said to be very effective and satisfactory. Another method of high candle power gas lighting, called in England the "air-light," brings the gas and air to the lamps through separate pipes, the air being under pressure.

High pressure and high candle power gas lighting was a noteworthy feature of the great International Gas Exhibition, held last December in Earl's Court, London.

Inverted Gas Lamps.—Inverted gas lamps, as now used in this country, have been improved during the past year by modifying the Bunsen so as to adapt it to the different kinds of gas made here. The mantle has also been so changed as to increase its candle power, now yielding, it is claimed, as high as 25.6 candles per foot; while the price of the lamps has been decreased. The sale of these lamps is beginning to develop in the United States, while this system of lighting seems to be becoming quite popular and promising in England, where quite a number of concerns are manufacturing the burners in a variety of designs, some of them very beautiful, the system lending itself more than any other to ornamental and decorative lighting. The Patent Office records in England indicate that invention is active at the present time with inverted burners. One or two makes of these burners are so constructed that there is no metal whatever in the direct heat of the flame, except a curved tube carrying the mixture of gas and air to the burner. Two or three styles of the burner look very much like Nernst electric lamps or small inclosed electric arcs. Another inverted lamp is built on the recuperative principle, and still another employs three mantles in a close cluster, while another is so constructed that if the mantle breaks from its support it does not fall away from the flame and thus extinguish the light. There is, however, only one concern in England at the present time manufacturing mantles for inverted burners, and it turns out from 15,000 to 20,000 per week. An English firm is selling, for use with inverted burners, what it calls a "rising and falling" gas pendant, which is very novel and permits the lamp to be quickly and easily raised or lowered through quite a distance. It is somewhat astonishing to know that inverted burners equipped with incandescent mantles are now being used very successfully and satisfactorily in England with Pintsch gas for train lighting the mantles being especially constructed for this purpose.

Street Lighting by Gas.—Street lighting by gas is unquestionably on the increase, both in this country and in Europe. For instance, out of 76,000 street lamps in London 71,000 are now lighted by gas. According to a German gas directory of 1904, out of 980 towns in Germany the streets of 726 are lighted entirely by gas, and partially so in 74 of the others. Marked improvements in the burners themselves, however, seem to be wholly confined to high pressure and other forms of high candle power lamps, and there has been much progress along these lines during the past year. Not only have the lamps themselves been improved, but means for lighting and extinguishing them automatically and from a distance are being perfected. Berlin is now experimenting with a system of lighting and extinguishing by increasing and decreasing the gas pressure. Most systems are seeking to accomplish the desired result in this manner, and some of them have practically achieved success. In one system, however, the gas is turned on and off by clockwork. It is proving quite successful, 40 towns employing it for practically all of their street lamps and 200 others employ it for a portion of them. The development of these systems for the long distance lighting and extinguishing of street lamps seems to further warrant the belief that street lighting by gas will eventually largely displace electric street lighting throughout the world.

Self-Lighters.—An English firm is marketing a lighting and extinguishing device for inside lights, consisting of a pneumatic push. A Berlin firm has brought out several different kinds of self-lighting devices for various kinds of burners, one of them, "the smoketop lighter," being placed on top of the lamp chimney somewhat like a mica canopy. Another German firm has gotten out a self-lighter of the pellet type, in which there is a contrvance for protecting the pellet from the injurious effects of the hot products of combustion. Clockwork, equipped with electrical connections, is also being utilized for simultaneously lighting or extinguishing all the lights in factories, stores, etc.

Holophane Globes.—The holophane system being really the application of known optical laws to glassware, there is no room for improve

ment, except in details of the manufacture of the globes and reflectors, several different sizes and shapes of which are now on the market. The manufacturers are prepared to make holophane glassware to order, suitable for special kinds of lights intended for special purposes.

SPECIAL SUBJECTS.

Photometry.—Considerable progress has been made during the year in the photometric testing of incandescent burners and mantles, much attention having been recently given to this subject. The "flicker" photometer is largely used for such work, although there are other types, one of which employs a milk or opal glass plate as a screen. A 4-way revolving jet photometer has also been brought out for testing either coal gas, water gas or mixtures thereof.

Calorimetry.—There has been a great advance during the past year in the direction of improving existing gas calorimeters and designing new ones, it being now generally recognized that calorimetry will largely supersede photometry with the increasing substitution of incandescent for open flame lighting, and with the increasing use of gas for fuel. Many gas companies are now making daily calorimetric tests of their gas. Several new types of calorimeters have been designed within the past year, both in this country and in Europe, and considerable progress may be expected in this direction in the near future. A recording calorimeter has been brought out in Europe and has, I think, been patented in this country.

By-product Coke Ovens.—During the year about 630 by-product coke ovens, of both the Otto-Hoffman and Semet-Solvay types, have been erected in the United States, making a total at the present time of about 3,700. Of these, about 70 per cent. are of the Otto-Hoffman type. Very few non-recovery coke ovens are now being built. A large proportion of the by-product ovens in this country are making illuminating gas in part, the Otto-Hoffman plants now producing about 17,000,000 feet per day. At least one town in England is now being supplied with by-product gas. At Sparrows' Point the illuminating gas is pumped under high pressure to Baltimore, 11 miles distant. From the Camden (N. J.) plant it is pumped 30 miles, to the city of Trenton. That portion of the gas to be sold for illuminating purposes is enriched either with water gas or with benzol extracted from that portion used for heating the ovens. In some plants the benzol is extracted and utilized in vapor form, in others in liquid form. An improved machine for quenching coke in an atmosphere of steam, invented over a year ago, has proven very successful, and a new self-sealing coke oven door has also come into general use.

Electrolysis.—There is not much new to report upon this subject. Last summer the German Society of Gas and Water Engineers appointed a commission to investigate the whole subject of damage to gas and water pipes by return currents from electric street railways and two of their findings are of special interest: (1) It is practically impossible to so insulate mains and services as to entirely prevent their injury by electrolysis, if other conditions are favorable for electrolytic action; and (2) metallic contact between the gas or water mains and the rails must not occur, as such connections encourage the destructive action of all joints in the mains where the contact is imperfect. As to the question of liability for injury to pipes from this cause, I have the following letter from Prof. D. C. Jackson, of the University of Wisconsin:

"The city of Dayton, O., during the past year asked for relief from the burden on their water works caused by electrolytic corrosion, and it asked for an injunction to prevent the railway company from allowing their electric currents to enter upon or flow along the water pipes. The lower court had passed upon the matter in a rather equivocal fashion. The court which considered the appeal handed down a very interesting decision, though it does not settle the question at issue. The court holds clearly that the railway company is liable for damage to the pipes and enjoins the railway from operating its system with a grounded return circuit which is defective. The decision, however, appears to hold the railway company liable only up to the limit of the best construction available in to-day's practice with the single trolley system. This particular part of the opinion rests partially upon questions of franchise or contracts with the city, and the obligations of a railway in respect to choice between single trolley and double trolley systems, under a condition where no pre-existing contract is met, have not yet been settled."

Gas Engines and Suction Producers.—I cannot find that there has been any marked improvement in the construction of gas engines during the year, such improvements as have been made having been along the lines of increased efficiency in regard to fuel consumption and regulation. The introduction and use of gas engines is, however, still constantly increasing. For instance, the California Gas and Electric Corporation, of San Francisco, has recently placed an order for some very large gas engines to drive three 4,000 kw. alternators. Many gas engine makers are now adapting and building their engines for use in connection with suction gas producers, which are rapidly coming into general use. With these producers no gasholder nor steam boiler is necessary, the engine itself drawing the gas through or from the producer for its own use, thus automatically making its own fuel just as it needs it, as it were. This method of generating power, especially in small units, is probably the cheapest of any method at the present time. While these suction producer plants may apparently be only of academic interest to gas companies, yet as a matter of fact they are direct and formidable competitors for a large part of our most profitable industrial business, and as such they are of much practical interest and importance to us.

The Gas Turbine.—There is increasing interest in the subject of the possibility of the development of a gas turbine. The success of the steam turbine is largely responsible for this. Engineers and scientists feel quite certain that a gas turbine will eventually be evolved, possessing great advantages over other prime movers; but thus far practically all efforts toward the invention of one have been limited to discussions, calculations and drawings, no actual model of a proposed machine having yet been constructed, so far as I can ascertain. Probably the best statement of the difficulties to be overcome in the construction of a gas turbine, and of the advantages which a successful gas turbine would possess, is the paper on this subject, read last October, by Mr. R. M. Neilson, of Manchester, England, before the Institution of Mechanical Engineers and published in the "Gas Journals" of this country and England.

Acetylene Lighting.—Although it is said that only about one-half of the works originally planned and built for the production of calcium carbide are now in operation, yet the use of carbide and acetylene is gradually though slowly increasing. The total world's production annually of calcium carbide is now said to be between 60,000 and 70,000 tons. It is stated that there are now 330 towns lighted by acetylene from central stations, of which 121 are in the United States, 80 in France, 54 in Germany, and 16 in Great Britain. The use of acetylene for car lighting is said to be increasing, the New York, New Haven & Hartford Railroad Company having recently decided to equip 1,039 cars for this system of lighting. The Wilson patent on carbide in England has recently been declared void, and this may stimulate new ventures in its manufacture and lower its price. In fact, the price of carbide has already decreased somewhat.

Odds and Ends.—An English concern has brought out a pipe bending machine that is a great saver of labor and material.

So-called bitulithic street pavement, in the construction of which a considerable percentage of pitch is used, has undergone another year of practical trial with results so satisfactory as to encourage the belief that its use will grow.

The use of hot tar for laying dust on roadways has been further experimented with during the year, particularly in Europe, with good results.

The manufacture of briquettes from anthracite slack and coal tar pitch is being begun on rather a large scale at Scranton, Pa.

The Saginaw City (Mich.) Gas Company has, during the past year, installed movable coke crushers operated by electric motors.

A 3-way safety gas cock has been put into use on ranges in natural gas regions for turning either artificial or natural gas into the stove and preventing their mixing with each other.

A new process for making gas and coke has been patented during the year in California.

A novelty in the shape of a so-called "illumination meter" has been brought out in Germany for measuring the amount of actual illumination falling upon any particular surface.

A "demonstration meter" has been devised for showing, in a manner easily understood by any consumer, the value in light or heat that he is getting for each penny he pays.

An English firm has brought out a small gas stove for tinners' use that can be easily and quickly taken apart and folded up into a small space for carrying.

A new 4-way by-pass valve has been brought out in England.

A new form of "respirator" has been devised in Germany for enabling workman to escape from places where there are poisonous gases.

A concern in this country is prepared to make apparatus for the production of yellow prussiate of potash, the final product obtained from recovered cyanogen; also for the production, from tar distillates after their use for the extraction of naphthaline, of clean white naphthaline for disinfecting purposes.

Two or three British gas works are now making their own firebrick,

utilizing waste in this way to good advantage. One English gas engineer uses a penny-in-the-slot meter for regulating his supply of air for purification purposes.

RECAPITULATION.

In summing up the findings of the foregoing report, I would venture the opinion that the most noteworthy progress of the year has been in the following directions, in the order of the degree of importance of the progress made:

1. Charging and discharging machinery; 2, vertical retorts; 3, high candle power gas lighting; 4, rotary and discount meters; 5, suction gas producers; 6, purification by ammonia; 7, long distance and multiple lighting and extinguishing of gas lamps; 8, the extraction of naphthaline by tar-oil distillates; 9, inverted burners; 10, calorimetry; 11, photometry of incandescent burners.

[Editor Butterworth's report was concluded by separate mention of the names of those who, through their replies to his queries, aided him in his work.]

Discussion.

The President—(Referring to the hearty round of applause which Editor Butterworth received at the conclusion of his report). That almost calls for an encore, Mr. Butterworth. Gentlemen—You have heard the report of Mr. Butterworth, the Editor of the Progress Department. Anyone wishing to make remarks about the report, or if there is anything additional which anyone desires to offer, the Association is now ready to hear from them.

Mr. Donald McDonald (Louisville)—It seems to me Mr. Butterworth has been wonderfully successful in keeping what might be called a registry of births. I wish some gentleman would undertake a mortuary report to be submitted at these various conventions. A great many of these improvements in the line of progress are undoubtedly important and will be successful, but a great many others will unquestionably prove failures during the coming year, and if at this time next year Mr. Butterworth will just take up this report and let us know how many of these things have proved utter failures and how many of them continue to grow and to prove successful, he would add something more to the large debt of gratitude which the Association already owes him for the valuable services he has performed.

Mr. G. W. McKee—During the recent researches which have been made in iron and steel, developing the fact that the melting point of low carbon steel is very much higher than the melting point of cast iron, is it not possible that a system of heat recuperation could be made, using cast steel sections for preheating primary and secondary air in coal gas turbines; and also, is there not the possibility of the development of a cast iron or steel retort which will stand the wear and tear that the ordinary fireclay retorts stand? In confirmation of that, I believe in the city of Milwaukee, recuperators have been made of wrought iron pipe which is very low in carbon, and I have been told that after one year's wear and tear, by sawing in two they give practically no evidence of deterioration. They were not eaten into by the oxygen on the inside, although worked up to red heat. Just in that connection let me mention the fact that we have developed heat recuperators in Detroit along the line of the Detroit Jewel water heater only in larger sections, the small sizes having a great capacity for heat interchanges, transferring the heat from waste gases to incoming air. In connection with the quality of fireclay goods, I have been looking for some time for some articles on the conductivity of firebrick. I have inquired from the engineers with whom I have come in contact as to whether any reliable information could be had on the conductivity of firebrick as to the effect of operation on the varying amounts of graphite that may be added, and matters of that kind. I have been constructing an apparatus for experimenting on that subject, but I do not want to do any experimenting until I am quite satisfied as to just what has been done in that direction. The only article I have been able to get hold of so far is the report of the University of the State of New York on fireclay. Furthermore, in connection with meters, I think Mr. Butterworth spoke of the high pressure meter. We have had some experience in Detroit in connection with high pressure meters on a Pintsch gas line, which I believe were invented by Mr. Wiley, the inventor of the proportional meter. I noted some tests I made on it which showed that the Pintsch gas destroyed the diaphragm of the meter. It was then treated with glycerine or some special treatment, I believe, by the meter company, but that does not seem to improve it. We have been considering the construction of a high pressure wet meter; that is, a meter with water in it, just like an ordinary wet meter, only the shelf to be constructed of cast iron or cast steel. In connection with instantaneous water heaters, it would be very advantageous if somebody could produce a reliable and simple thermostat. We have been buying the various kinds which have been on the market in the hope of securing a good one. So far we have not been able to get one that is positive enough in its action, and at the same time fairly simple. We have been trying the Lawson and several others, but we would like to get something that would shut the gas down absolutely at the desired point. In connection with the gas turbine, I believe the "Gas Engine Journal" within the last two or three months—but I am not sure just which issue—quoted instances of a gas turbine that had been operated in Paris for one year successfully, giving an efficiency that was quite on a par with the ordinary gas engine—I mean an engine that can be relied upon to operate within 1°, although there is no difficulty in obtaining them where they will operate within 10°. The principle of operation was similar to that of the Pelton water wheel, and another concern is building a gas turbine for running automobiles, and it has, I understand, been in successful operation for some weeks.

The President—Mr. Brown, have you anything to offer on the Progress Department? I remember you have such a department in the "Progressive Age," and I thought possibly you might have something of interest to furnish us.

Mr. E. C. Brown—I do not know that I have anything to add to the very comprehensive, thorough and complete report made by my brother editor, Mr. Butterworth. It satisfies me of the correctness of the remark of Brother Jasper that the "World do move" and that progress is being made. I should very much like to see Mr. Butterworth's work extended and the field broadened. While it gives a concise *resume* of much that has been published in the different association meetings, much have gone before and in the various technical journals, nevertheless to condense it as Mr. Butterworth has condensed it, and to present it as he has presented it, are matters of very great importance and of very great benefit to the gas industry. I do not know that I have anything to add specifically beyond what I have said.

Mr. Steinwedell—I think very few of us appreciate the tremendous amount of work that Mr. Butterworth has performed in preparing this report. It means going through a great many of the technical journals, new books and everything that comes out, even including the advertisements. Mr. Butterworth has taken these matters of information and condensed them very concisely and very thoroughly. I think that while the Association in a general way appreciates it, we do not realize the amount of time, labor and difficulties it represents. It is a class of work which you cannot rely upon an assistant to do. It has to be done by the editor himself, and I, therefore, move that we extend to Mr. Butterworth a very hearty vote of thanks, that he be earnestly requested to continue the work, and that we emphasize our appreciation of his efforts by a rising vote.

The above motion was duly seconded and a unanimous rising vote was reported.

The President introduced Mr. J. D. Shattuck, of Chester, Pa., who as Chairman of the Committee read the following

REPORT OF COMMITTEE ON FLOW OF GAS IN PIPES:

To the Ohio Gas Light Association: Gentlemen: I have the following report to make for the progress in high pressure distribution this year. Daily tests of candle power have been kept at our Tilghman street works to show the difference between the candle power of compressed and uncompressed gas. Six months of the year we were compressing coal gas and 6 months water gas. The loss in candle power in compressing coal gas, up to the actual pressure of 25 pounds, has been .3 of a candle, and water gas within a 1½ candle average, about .9 of a candle loss.

An attempt has been made to gather together all the formulæ that have reference to the flow of gas at high pressure and I have obtained to date the following formulæ:

The formula known as Pittsburgh

$$Q = 3{,}450 \sqrt{\frac{d^5 \times (P_1^2 - P_2^2)}{1r \text{ when } g = .6}}$$

Coxe formula

$$Q = 41.3 \sqrt{\frac{d^5 (P_1^2 - P_2^2)}{L \text{ when } g = .65}}$$

F. H. Oliphant

$$Q = 42 \sqrt{\frac{d^5 (P_1^2 - P_2^2)}{L}} + \frac{d^3}{30}$$

Prof. Robinson's formula

$$Q = 48.4 \sqrt{\frac{d^5}{L} (P_1 + P_2) (P_1 - P_2) \frac{0.6}{g}}$$

Prof. Robinson's formula (more refined):

$$Q = 48.4 \frac{T_1}{\sqrt{T_2 T_0}} \sqrt{\frac{d^5}{L} (p_1 + p_2 + 30)(p_1 - p_2)} \frac{0.6}{g}$$

W. C. Unwin's formula:

$$Q = \frac{\pi P_1}{4 P_2} D^2 \times 468 \sqrt{\frac{D}{c\ g\ lf} \times \frac{P_1^2 - P_2^2}{P^2}} \times 3{,}600$$

Richards' formula:

$$Q = \sqrt{\frac{10{,}000\ d^5 c\ (P_1 - P_2)}{lf}} \times 60 \text{ correct for gas } \sqrt{\frac{1}{g}}$$

Hiscox's formula:

$$Q = C \sqrt{\frac{d^5 (p_1 - p_2)}{w\ lf}} \times 60$$

Prof. Lowe's formula:

$$Q = C \frac{P_2}{14.7} \sqrt{\frac{d^5 (p_1 - p_2)}{\frac{.0761\ g\ P_2\ lf}{14.7}}} \times 60$$

The formula of the Pitot tube:

$$Q = \frac{1{,}690\ d^2 \sqrt{h\ (l + p)}}{15}$$

From *Journal Für Gasbeleuchtung*, October 10, 1904; believed to be "Wehrle's:"

$$P_1 - P_2 = 393.7 \left(\sqrt{1 + \frac{lf \times g \times Q^2}{360{,}530{,}000\ d^5}} - 1 \right)$$

The description of the terms of these formulæ is given in the article contributed by the writer to the revision committee. This article contains a good many tables of the various constants used in conjunction with the different formulæ. The writer has considerable additional information that has not yet been boiled down in good shape which he hopes to be able to submit in complete form next season. It is hoped that everybody who is connected with high pressure systems will send the writer all the observed deliveries of high pressure mains with as many details relating to pressure, temperature, length and size of mains, the difference in altitude between the inlet and outlet, that he may be able to dig up. It is felt a little more study of this subject will result in the proving of the best formula for the delivery of artificial gas.

Discussion.

The President—This report, while not very lengthy, has involved a great deal of work and a great deal of time and research. I understand from Mr. Shattuck that he has been desirous of having some actual tests made within the next year, so if any member has in his possession any data which would be helpful to him, I am sure he will be very glad to hear from them. Does any member desire to discuss the report?

Mr. D. McDonald, Louisville—I would like to ask Mr. Shattuck which one of these numerous formulæ he thinks is the nearest right? They will give results varying from two to three hundred per cent., and if we just took our choice; well you know we can "teach the world round or teach it flat," as the school teacher said.

Mr. Shattuck—In my report to the Revision Committee, which I understand has not been printed, I give a synopsis which may answer Mr. McDonald's question a little more fully than in the report of the Committee which I just read. Mr. Shattuck then read the following:

High Pressure Formulæ. Values of Characters in All Formulæ.

Q = cubic feet delivered per hour.
P_1 = absolute initial pressure (14.7 + gauge pressure) per square in., pounds.
P_2 = absolute terminal pressure (14.7 + gauge pressure).
P_1 = gauge pressure initial in pounds.
P_2 = " " terminal "
D = diameter in feet.
d = " inches.
L = length in miles.
l = " yards.
lf = " feet.
g = specific gravity air = 1.

To correct formulæ for other specific gravity than that given, multiply result by $\sqrt{\frac{\text{formula gravity}}{\text{sp. grav. of gas.}}}$

C = constant.
π = 3.1415.
T_0 = absolute temp. at maximum density of water (461+37) 498° F.
T_1 = " " of gas delivered (461 + F.)
T_2 = " " " flowing in main.

In the following formulæ I have substituted the common characters above, so that they may be more easily compared.

Pittsburgh formula (courtesy Mr. Peter Young):

$$Q = 3{,}450 \sqrt{\frac{d^5 \times (p_1^2 - p_2^2)}{lf \text{ when } g = .6}}$$

Coxe formula (courtesy Mr. Brown):

$$Q = 41.3 \sqrt{\frac{d^5 (p_1^2 - p_2^2)}{L \text{ when } g = .65}}$$

Mr. F. H. Oliphant:

$$Q = 42 \sqrt{\frac{d^5 (p_1^2 - p_2^2)}{L}}$$

Used this formula for 8 inches, which was practically borne out on 100-mile test into a gasholder. For larger pipes he had to correct, adding: $\frac{d^3}{30}$ to d^5. Mr. Oliphant also furnished me with some tables from which results of above formula could quickly be read off. $\overline{d + d}$.

Correcting above for $\sqrt{d^5 + \frac{d^3}{30}}$ and calling this value "A," we have

$$Q = 42a \sqrt{\frac{p_1^2 - p_2^2}{L}}$$

for "a" = we have

$\frac{3}{4}$ in. =	.0317	$2\frac{1}{2}$ in. =	10.37	8 in. =	198.0
$\frac{7}{8}$ " =	.1810	3 " =	16.50	10 " =	350.0
$\frac{3}{4}$ " =	.5012	4 " =	34.10	12 " =	556.0
1 " =	1.0000	5 " =	60.00	16 " =	1,160.0
$1\frac{1}{2}$ " =	2.9300	$5\frac{5}{8}$ " =	81 00	18 " =	1,570.0
2 " =	5.9200	6 " =	95.00	20 " =	2,055.0
				24 " =	3,285.0
				30 " =	5,830.0
				36 " =	9,330.0

Mr. Oliphant's report to the government on the "Production of Natural Gas in 1902" contains, in addition to the above, much useful information on this subject.

Prof. Robinson's formula:

$$Q = 48.4 \sqrt{\frac{d^5}{L} (P_1 + P_2)(P_1 - P_2)} \frac{0.6}{g}$$

Prof. Robinson's (more refined):

$$Q = 48.4 \sqrt{\frac{T_1}{T_2 T_0}} \sqrt{\frac{d^5}{L} (p_1 + p_2 \times 30)(p - p)} \frac{0.6}{g}$$

W. C. Unwin's:

$$Q = \frac{\pi P_1}{4 P_2} D^2 \times 468 \sqrt{\frac{D}{8\ g\ lf} \times \frac{P_1^2 - P_2^2}{p^2}} \times 3{,}600$$

Gas World 6/11/04.

Note.—P in this case means ft. head water.

14.7 = 34 ft.

$$c = .0044 \left(1 + \frac{1}{7d}\right)$$

c = 2 in. .0082, 6 in. = .0057, 12 in. = .005, 18 in. = .0048, 24 in. = .0047.

Journal für Gasbeleuchtung:

$$P_1 - P_2 = 393.7 \left(\sqrt{1 + \frac{ef \& g\ 2^3}{360{,}530{,}000\ d^5}} - 1 \right)$$

10/1/04.

Note.—Believe this formula is "Wehrle's."

Richard's compressed air formula:

$$Q = \sqrt{\frac{10{,}000\ d^5\ c\ (P_1 - P_2)}{lf}} \times 60$$

for gas multiply $\sqrt{\frac{1}{g}}$

Values of C for

1 inch =	.35	3 inch =	.73	8 inch =	1.125
$1\frac{1}{4}$ " =	.5	$3\frac{1}{2}$ " =	.787	10 " =	1.2
$1\frac{1}{2}$ " =	.662	4 " =	.84	12 " =	1.26
2 " =	.565	5 " =	.934	16 " =	1.34
$2\frac{1}{2}$ " =	.65	6 " =	1.	20 " =	1.4
				24 " =	1.45

Hiscox's:

$$Q \times c \sqrt{\frac{d^1 (pl - p_2)}{wlf}} \times 60$$

W = weight of air of 1 cubic foot at initial pressure.
C in this formula is D'Arcy's coefficient and not a constant.
W can be found from W = .0761 (0.068p + 1).

$c\sqrt{d^5}$ = for 1 in.	45.3	5 in. =	3,298
$1\frac{1}{4}$ "	86.0	6 " =	5,273
$1\frac{1}{2}$ "	138.3	7 " =	7,817
2 "	297.0	8 " =	10,988
$2\frac{1}{2}$ "	537.0	9 " =	14,872
3 "	876.0	10 " =	19,480
4 "	1,858.0	12 " =	30,926
		14 " =	45,690
		16 " =	64,102

V = vol. before compression. V_1 after compression.

$\sqrt{W}$ can be found as follows:

Pressure gauge V_2	$\sqrt{W}$	Note if value $\sqrt{W}$
Initial V_1	Used multiply final result by value	$\frac{V_2}{V_1}$ in.
	Ratio	
0	1.00	0.276
5	1.34	0.319
10	1.68	0.358
15	2.02	0.392
20	2.36	0.424
25	2.70	0.453
30	3.04	0.481
35	3.38	0.507
40	3.72	0.532
45	4.06	.556
50	4.40	.578
55	4.74	.600
60	5.08	.622
65	5.42	.642
70	5.76	.662
75	6.10	.681
80	6.44	.700
85	6.78	.718
90	7.12	.736
95	7.46	.753
100	7.80	.770

Correct for difference in density between air and gas.

Prof. Lowe's:

$$Q = C \frac{P_2}{14.7} \sqrt{\frac{d^5 (p_1 - p_2)}{.0761\ g\ P_2\ l^f}} \times 60$$

"Progressive Age," page 501, 1904.

Diameter of pipe	0.5 in.	2 in.	3 in.	5 in.	6 in.	7 in.	8 in.	9 in.
c =	36.8	52.7	56.1	58.4	59.5	60.1	60.7	61.2
Diameter of pipe	10 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.	
c =	62.1	62.3	62.6	62.7	62.9	63.2	63.2	

The Pitot tube and methods of using it are described in a paper read before the American Society of Mechanical Engineers, Dec., 1903, and forming part of Volume XXV. of "Transactions," by W. B. Greogory, of New Orleans, La. The description was taken from "Histoire de L'Academie des Sciences," 1732, p. 376. I give here what Mr. Oliphant says about the Pitot tube:

"This method depends upon the momentum of the flowing gas inside the gas main, because of which the quantity can be quite accurately determined by means of a device known as the Pitot tube, which consists of a small metal tube inserted in the pipe line, bent at a right angle and having its open end turned in the direction from which the gas is flowing. This tip communicates with one branch of a glass U-tube partly filled with some liquid (generally water). The other branch of the U-tube is connected to another opening in the pipe line, the plane of which is at right angles to that of the opening into the Pitot tube and that of the flowing gas, By this means the branch connected to the Pitot tube will show a higher pressure than that connected to the pipe line, due to the momentum of the gas flowing against it. This difference of pressure will be shown by the difference in level of the liquid in the U-tube. Since this force is due to the velocity and density resulting in momentum of the gas passing, the rate of flow can be obtained and by frequent observation the velocity of the gas in a known area can be readily determined. The formula of the Pitot tube as applied to gas measurement has been very carefully determined by Prof. S. W. Robinson, whose report is published in the Geological Survey of Ohio, Vol. VI., pages 548–594."

The final formula is:

$$Q = 1{,}690\ d^2 \sqrt{\frac{h\ (1 + p)}{15}}$$

in which

Q = number of cubic feet of gas flowing in pipe line per hour; d = diameter of pipe line in inches; p = static pressure of gas in pounds; H = difference in level of water in U-tube, measured in inches.

The formula was originally computed for gas flowing through the tube at a temperature of 40° F., but the temperature has been reduced to a standard temperature of 50° F., in the measurement by the formula as given above. It is for gas of 0.60 sp. gr. To apply to gas of any other gravity multiply the result by $\sqrt{\frac{0.6}{\text{sp. gr. gas.}}}$

All of the above formulæ were derived from Dr. Pole's formula, and are more or less successful attempts to add corrections to that formula for density and co-efficients of friction due to compression. The more complicated formulæ are simply attempts at greater refinement.

It has come to be pretty generally understood that each sized pipe requires a change in the formula to give its particular result. The co-efficient of friction does not seem to vary with different densities of gas but varies with each size pipe.

Unwin says, co-efficient of friction varies with roughness of pipe, diameter and velocity, and I would add possibly density. I believe the formulæ recognizing a different co-efficient for each size are the most accurate. I do not believe the full accuracy of any formula is yet established. Accurate results from actual tests should be kept by some one and tabulated until a true formula can be secured. Until such time practical working results can be had from the best natural gas practice, as embodied in Prof. Robinson's formula and Cox's computer, which gives safe results.

I have three cases the accuracy of measurement of which I do not know. Newton, Mass.; a 6-inch line, 9,600 feet long, 10 pounds initial gauge pressure, 9.28 final gauge pressure, delivered 18,200 cubic feet per hour.

Chester, Pa.; 6-inch line, 7,514 feet long, 27 pounds initial pressure, 25½ pounds final gauge pressure, delivered 20,100 (not satisfied with accuracy of measurement.)

Mr. Oliphant says he checked his formula on delivering natural gas 100 miles into a gasholder through a 8-inch pipe.

I have the following results taking the Newton condition:

Pittsburgh formula	18,380	cubic feet	per	hour.		
Coxe's	"	16,000	"	"	"	"
Oliphant's	"	16,260	"	"	"	"
Robinsons'	"	18,730	"	"	"	"
Unwin's	"	3,1870	"	"	"	"
German	"	22,060	"	"	"	"
Richards (corrected for .6 gas)		18,708	"	"	"	"
Hiscock's	"	"	16,250			
Lowe's	"	"	26,910			

I am indebted to Dr. H. B. Harrop, of Milwaukee, for considerable assistance in obtaining several of the above formulæ.

Mr. Doherty—I do not want to discuss the paper, but simply want to say something to encourage Mr. Shattuck to continue his good work. There are plenty of opportunities offered in many American gas works to make tests and to send in the data which he can check up with actual tests and see how these compare with the formulæ, and in this way determine which one is more nearly correct. For my own part I am very much in doubt as to the accuracy of any formulæ under differing conditions. We assume that the conductivity of our pipes increases as the square root of the fifth power, but I am not at all satisfied that they do, and I am not at all satisfied that that is the proper way to state it. I have always felt we ought to increase our area as a positive factor of flow, and as the cross area is a positive factor of the flow and the superficial area of the inside of our conductor is a negative factor, and applying the flow to that, then applying the old law that the flow of gas would vary as the square of the velocity, it would gives us a factor more radical than our present factor. But the work Mr. Shattuck is doing I think is very important. It is rather embarassing to know that we cannot tell how much gas a certain pipe is going to deliver or what size pipe we ought to put in to secure delivery of that gas under given conditions. I think it is the most important problem now confronting the gas fraternity, if they want their professional skirts clean.

On motion of Mr. D. McDonald (Louisville), the report of the Committee was received with the thanks of the Association and the Committee was continued.

An adjournment was then ordered until 9.30 o'clock the following A.M.

[To be Continued.]

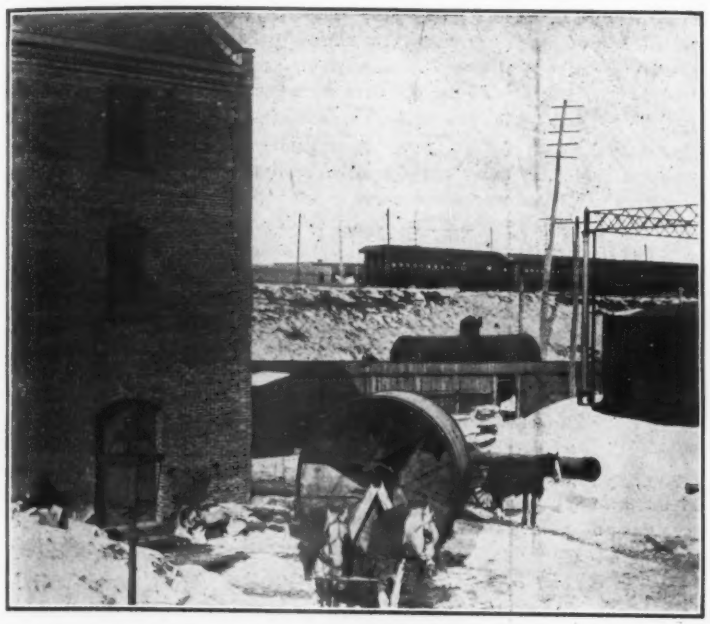
Moving A Station Meter in Winter.

By Mr. G. B. Leland, Stamford, Conn.

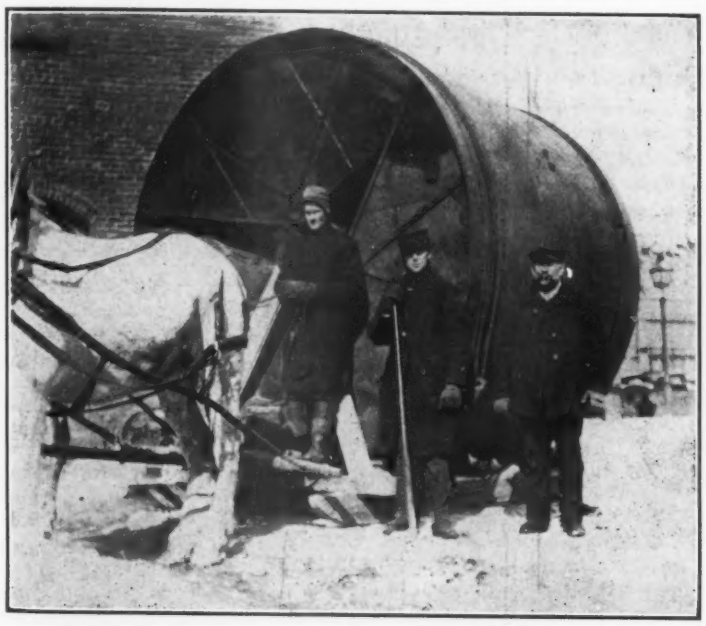
Although it may seem a trifle late as to time, I propose to give you herewith the cause which prevented me from attending the last meeting of the New England Association of Gas Engineers. Having found out that a station meter would add to the effectiveness of the plant of the Stamford Gas and Electric Company we finally purchased from the Bridgeport (Conn.) Gas Light Company a second hand 11-foot meter which looked to fill the bill. When we came to move it from its old home to our establishment we found that quite a problem confronted us.

The size of the drum was such that we could not load it on a railroad flat car, the harbors of Long Island Sound were so frozen that we could

1. Oliphant's corrected formula, 17,510.



not count on water transportation, and because of the bridges over the roadways it was not possible to move it on an ordinary wagon. The



meter manufacturers advised us against trying to move the drum intact but as they had gone over it carefully and had reported it in first-class

condition we did not feel like giving up; at least until we had to. We finally arranged with Mr. Dawson, a Bridgeport truckman, who agreed to move the drum on a sled.

The meter case was taken apart and loaded on the cars, the drum was placed on skids, and on the 17th of February truckman Dawson started with the drum on the journey from Bridgeport to Stamford, a distance of 23 miles. Everything worked favorably, and the distance was covered in something less than 24 hours. The night stop was made at Norwalk, and Stamford was reached about noon of February 18th.

It was fortunate that the ground was covered with snow, for otherwise the job could not have been accomplished. Even loaded as low as it was the top of the drum only cleared the undersides of the railroad bridges by less than 4 inches.

The meter has been erected and is now running. The only damage done was one small nail hole drive which was discovered before the drum was placed in the case. The sketches herewith show the history of the "moving," and the story reveals how it was that one New England Superintendent was unable to attend the last meeting of the New England Association of Gas Engineers.

The Fleming Cymometer.

The London Physical Society recently had Prof. J. A. Fleming, F.R.S., read a paper on the application of the cymometer to the "Measurement of Coefficiencies of Coupling of Oscillllation Transformers." The cymometer is an invention of Prof. Fleming's, by means of which the frequency of electrical oscillations can be measured as well as the length of electric waves. The present one is largely one of calculation; by means of which the number of oscillations per second, such as would proceed from a condenser for instance, are obtained from a knowledge of the values of the resistance, self-induction and capacity of the condenser and its circuits. When the number of oscillations per second are obtained, and they may range from one million to many millions per second, the length of a wave is obtained by dividing the speed of light, 192,000 miles per second by the number of oscillations in the same period of time.

For instance, if calculation shows that 192,000 waves are projected by static discharge per second, the length of each wave would equal 192,000 miles divided by 192,000 waves, giving 1 mile as the length of each wave.

The cymometer consists of a sliding tubular condenser having two brass tubes separated by a thin ebonite tube, the outer tube capable of sliding off the inner tube. Parallel with this sliding condenser is placed an inductance coil or helix of bare copper wire wound on an ebonite tube. The outer brass tube of the sliding condenser carries a collar, which in turn carries a rod with a crutch at the end resting upon the iuductance coil. The circuit of the instrument is completed by a copper bar, which joins one end of the inductance coil with the inner surface of the sliding condenser. When the outer tube of the condenser is moved by an insulating handle, the same motion reduces equally the capacity of the condenser and the position of the inductance coil included in the closed circuit. The circuit therefore consists of a variable capacity and inductance in series.

Prof. Fleming calls the square root of the product of the capacity and inductance in any position, the oscillation constant of the instrument. A scale is provided parallel with the inductance coil on which is engraved the oscillation constant and the corresponding frequencies. The formula generally given for a particular self-induction and capacity is that the frequency in waves thus resulting is equal to $1 \div (2 \times 3.1416 \times$ the square root of the product of the capacity and inductance). The cymometer is also provided with a vacuum tube, preferably a Neon vacuum, which is connected between the inner and outer surfaces of the condenser.

The copper bar is placed parallel and near to a circuit in which oscillations are taking place and the handle of the instrument is moved thus varying the oscillation constant, until the vacuum tube glows more brightly. Under these circumstances, it is known that the circuit of the cymometer is in resonance with that of the circuit being tested and their oscillation constants are therefore the same, hence the scale reading gives the product of the capacity and inductance of the circuit being tested. The instrument is also provided with a rectangular wire circuit the inductance of which is known. If this circuit is joined up with any unknown capacity and oscillations set up in it, the cymometer can be used as above, to determine the product of capacity and inductance in the circuit being tested, and the inductance being known the capacity is therefore known also. Again, if we have any oscil-

lation transformer, we can join up the primary and secondary circuits so as to inductively oppose or aid one another.

The inductance of any circuit can be obtained for the high frequency currents by the cymometer in the following manner: The circuit to be tested is joined up in series with a known capacity and the rectangular circuit provided with the instrument. Two measurements are then made—first, when the inductance to be tested is included in the circuit; and second, when excluded from it. If the oscillation constants in both these cases are obtained, then the inductance will be equal to the oscillation constant of the first test minus the oscillation constant of the second test divided by the capacity, or

$$\text{Inductance} = \frac{\text{1st oscillation constant} - \text{2d} \quad " \quad "}{\text{capacity.}}$$

The cymometer is particularly applicable to the measurement of the oscillation constant of a wireless telegraph aerial. The frequency in an open oscillation circuit and the length of ether wave resulting would be a valuable accomplishment from a direct practical standpoint. The frequency and length of wave received at a distant receiving point would also add greatly to knowledge required on the subject if measured, as claimed, with sufficient accuracy.

As regards the coefficient of coupling and the respective energies of the two rates of oscillation Prof. Fleming said he had not given sufficient attention to the theoretical side of he subject to be able to furnish expressions for the energies of the two oscillations.

In connection with this wireless telegraphy and the antennæ or aerial employed, Prof. Fleming stated that if the mutual induction between the aerial and the cymometer were small, as it was in the case of the instrument exhibited, then the cymometer only detected the oscillations which existed in the aerial. There was no creation of duplicate oscillations in and by the cymometer itself.

The change in the dielectric capacity of such insulating materials as rubber and glass were discussed by Prof. Fleming in answer to a question asked; and he stated that rubber or ebonite was chosen in place of glass because in this material the change in this respect could not be detected with varying frequencies.

In glass the strange fact is presented, that under the varying stress of frequency the dielectric quality of it changes. To remove such possibilities in his apparatus, the only material reliable enough to give the element of accuracy required was ebonite. Thus the general nature of the application of Prof. Fleming's device as thus reviewed, is that of readily discovering the frequency and length of long electric waves. This is possible by means of an inductance and capacity that are adjustable. When adjusted and a certain degree of resonance is established the little Neon tube will glow. By this indication it is known that the circuit undergoing examination, and the cymometer are in tune electrically with each other. The immense advantage obtained by this device by those experimenting in the field of wireless telegraphy and telephony or to those conducting scientific experiments can very well be imagined.

With a definite knowledge of frequency and wave length during all experiments and tests, it seems that the striving after syntonic telegraphy will rapidly approach a successful issue. Sympathetic systems, which, unless awakened to action and response by a certain frequency, are inoperative, and thereby preserve the privacy so necessary to practical success, will now be tuned with accuracy. The cymometer is thus of peculiar value at this particular period in the development of wireless methods as in all probability time will so readily testify.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. William B. Miller, Superintendent of the Gas Department of the Birmingham (Ala.) Railway, Light and Power Company, is informed that it is not the Journal's practice to reveal the names of its correspondents. In fact, if we mistake not, such is the practice of most newspapers. As far as the "Item" to which Mr. Miller refers is concerned, the Steiner Brothers, the bankers referred to, can shed much light thereupon. Personal replies can hardly be expected by readers who fail to inclose the necessary return postage.

Mr. John P. Tompkins, Secretary and General Manager of the Atlantic City (N. J.) Gas and Water Company, is informed that the "item" referred to simply meant that that Company should have put its mains into Longport years ago. The Mr. Reed concerned was interested some years ago with an Atlantic City Councilman named Byrne or Byrnes, whose wife operated an excursionist boarding house "up-the-inlet-way." Mr. J. Walter Wood, of the R. D. Wood Company, of Philadelphia, we believe had some public experience with Messrs. Reed and Byrnes, when the Wood folks controlled the old system of gas and water supply for Atlantic City. General Manager Tompkins neglected to inclose a stamp for reply.

Mr. W. H. Miller, General Manager and Superintendent of the Hamburg (Pa.) Gas Company, writing to us under date of the 17th inst., among other things, said: "We have connected up 42 new consumers since the 1st of March, 28 of them taking on gas ranges. This makes a total of 121 meters installed since June 17th, 1904."

The Eau Claire (Wis.) Gas Light Company has recently placed an order with the Central Supply Company, of Minneapolis, Minn., for 18 carloads of pipe, which is to be used for main extensions. The Douglas-Luebkeman syndicate evidently mean that the Eau Claire folks are to have gas and plenty of it.

Mr. J. Edgar Smith, Secretary to President Humphreys, of the Stevens Institute of Technology, informs us that the plan of calling in practising engineers from time to time to address the student-body on special topics will not be discontinued this year. In fact, the programme for 1905 in the named respect will be on a more elaborate scale than heretofore. After the senior members have passed their final examinations about 6 weeks of the college year will remain, during which period they will not be subject to the routine of the regular roster. This time is assigned mainly to the work incidental to the preparation of the theses that the members of the class must present before they can be graduated. Four hours per week will be reserved for a course of special lectures, to be delivered by a number of professional men, eminent in their several lines of work. This schedule is expected to include talks on telephone practice, ship propulsion, the business features of engineering practice, patent law, civil engineering, electrical engineering, the advantages of system, etc. The concluding lecture will be delivered by President Humphreys.

The bill to permit the Hartford City (Conn.) Gas Light Company to issue $1,000,000 bonds has been sanctioned by the Senate.

The resolution passed by the Connecticut Senate, permitting the Pynchon Land and Construction Company to supply gas in Enfield, Windsor Locks, East Windsor, South Windsor and Somers is not likely to secure final operating orders.

The following notification to the residents of Springfield, Mass., put forth by the authority of the executives of the Springfield Gas Light Company, explains itself:

"The work of modernizing the manufacturing plant of the Company, in which $300,000 has been expended, is now nearly completed, and the plant is to-day probably the best equipped gas plant of its size in the United States. The stockholders of the Company who subscribed for the last stock issue at $200 per share have, during the past year, received dividends netting them practically 6 per cent. upon the capital invested. The Company has paid taxes during the same period of $17,000, of which amount $1,000 was paid to the city of Springfield. This amount is nearly 70 per cent. more than the amount of taxes paid by the Company when the present management assumed control. The Company recently closed contracts for coal and oil for the ensuing year, and it is now in a position to allow the following discounts: After July 1, 1905, and until further notice thereof, the following prices will be in effect: All gas will be billed monthly at $1.10 per 1,000 cubic feet, with a discount of 15 cents per 1,000 cubic feet for prompt payment, on or before the 10th day of each month, making a net rate of 95 cents. We trust that this arrangement will meet with the approval of all our customers, and that it will lead to so large a consumption of gas that we can continue it in force regardless of the fluctuation of the prices of materials."

Mr. Richard Schaddelee has resigned from the post of Manager to the Albion (Mich.) Gas Light Company, to assume charge of the affairs of the syndicate in control of the gas properties at Cheboygan and Cadillac, Mich., and La Porte, Ind.

MR. C. H. WHEELER has accepted a place in the service of the Appleton (Wis.) Company.

MR. WM. H. ENGLISH, one of the organizers of the Washington (D.C.) Gas Light Company, died in Indianapolis, Ind., the morning of the 10th inst. Deceased served the Washington Company as its Secretary for 10 years or more, and was quite a prominent figure in the Nation's capital for the years immediately preceding and during the civil war. He was in his 85th year, having been born in Clermont county, O., June 12th, 1820.

IT is said that negotiations are pending looking to the transfer of the properties of the Madison (Wis.) Gas and Electric Company to the control of the North American Company. Manager Corscot of the former Company, however, says rumors of that sort have been in circulation for 5 years or so.

A CORRESPONDENT in Wilkes-Barre, Pa., forwards the following, under date of the 15th inst.: "The Wyoming Valley (Pa.) Gas and Electric Company has purchased the gas plant at Mahanoy City. This makes the 13th plant now in possession of the Company, the complete list being as follows: Plymouth, Plymouth Township, Edwardsville, Kingston, Dorranceton, Luzerne Borough, Forty Fort, Nanticoke, Hanover Township, Newport Township, Hazelton, Kingston Township and Mahanoy City. The plant will be improved and enlarged at once and brought up-to-date in every particular by the addition of new machinery. Patrons will be supplied with gas at rates which will bring it within the reach of all. General Manager A. C. Swain negotiated the purchase."

MESSRS. M. L. CASEY, Hugh Jackson and Charles Schuworth have filed articles incorporating the San Angelo (Tex.) Gas Company. They propose to supply gas to the residents of San Angelo and the surrounding territory "for any and all purposes for which the same may be desired." The concern is capitalized in $40,000.

MR. ARTHUR E. JACKMAN has resigned the position of Superintendent to the Willimantic (Conn.) Gas and Electric Light Company.

AT the special town meeting of the voters of Leominster, Mass., held to determine whether or not the authorities should acquire the plants of the Leominster Gas Light Company and the Leominster Electric Light and Power Company, for operation on municipal account, the count showed 277 in the negative and 258 in the affirmative.

THE report of Mr. William H. Snow, Manager of the Gas and Electric Department of the city of Holyoke, Mass., accounting for the operations of the named departments for the year 1904, is as follows: "Gentlemen—I hand you herewith the second annual report of the Gas and Electric Department. The past year has been one of progress both in getting the lighting plants into good working condition and in the amount of new business acquired. The reduction in the price of gas May 1 diminished the receipts from the sale of gas at the rate of over $15,000 per year, so that for 4 months they were less than those for the corresponding months of 1903; but in the fifth month after the reduction, owing to the increased amount of gas sold, they exceeded those of the previous year. The sales of tar have fallen off, and owing to the condition of the tar market the price had to be reduced, so the receipts from the sales have fallen behind. The sales of coke continued satisfactory. The expense of repairs has been heavy. Both plants when the city took them needed extensive repairs, but for the first year only the most pressing needs were taken care of. This year thorough repairs have been made, making a seemingly excessive account. At the gas works there have been two benches of retorts rebuilt, the floor of the retort house relaid, the water gas apparatus relined and some of the fittings on it replaced, the roofs put into proper shape, a new wash room, with 40 lockers and shower bath and closets for the men, has been built, a room for the new shavings scrubber has been made out of the old wash room, the scrubber installed, a new drum put into the station meter. doubling its capacity, the No. 3 gasholder has been painted, together with numerous minor repairs and painting. The street mains have had the usual overhauling for leaks. At the electric station the gravel roofing was replaced by a new one and the necessary repairs and painting on the buildings have been done. December 1, 1903, there were 36.66 miles of street mains laid and 4,518 gas meters in service. During this year there was laid 8,357 feet of pipe, with 911 feet of small pipe abandoned, making a total of 38.26 miles of main in service. There have been set 629 meters, making a total of 5,147 meters in use in the city, a gain in the number of 13.9 per cent. There have been laid 141 new service pipes The changes at the electric station that were underway a year ago have been completed. There are now installed two 350-kilowatt generators, with their accompanying switchboards bearing the necessary switches, indicating and recording instruments and current regulator. The work is now being done of putting in foundations for the 450-kilowatt generator contracted for the past summer. This should be in running order by January 15. After much investigation and deliberation, it was thought best, in the proposed addition to the station, authorized November 1, to install a turbine generator set of 500-kilowatt capacity. While the installation of a steam turbine instead of a reciprocating engine is a move out of the beaten track of steam engine practice, its introduction in electric stations is becoming more and more general, and its success is so pronounced that this installation seemed the best one to make for the city. This machine will probably be installed and run next May. When all the proposed apparatus is installed, the city will have a station capable of delivering 2,200-horse power, with water and steam combined, giving a margin for several years' growth without any considerable outlay of money, unless an unforseen amount of business develops. The prospects of increased business are very good both in lighting and power. The department has engaged to furnish within the next 5 months over 300-horse power in current in addition to that already furnished. At the present time the station is using about 1,200-horse power, so it can readily be seen these additions were necessary. Besides the changes at the station, the work of overhauling, changing and extending the lines of poles and wires through the city has been completed. There are now installed 493 street arc lights, fifteen 30-candle power and twenty-four 16-candle power electric incandescent lamps. There are set 2,195 poles carrying 131 miles of main wire. There are 366 customers using electricity, 43 of which are using it for power. This is an increase in the number of 93, or 33 per cent. In my report for 1903 I recommended the acquiring of the necessary land for and the construction of a new gasholder. The increased business of the past year has emphasized the need of it. The sendout of gas at the present season is averaging 466,300 cubic feet of gas for each working day, with a maximum sendout of 527,500 feet. With a storage capacity of less than 250,000 cubic feet, and with the number of chances of accidents happening at the gas works stopping or curtailing the make of gas, it is an unsafe condition to work under. If an exhauster breaks, a steam or an oil pump goes to pieces, steam engine or fan blower gives out, or if the larger accident of an explosion should occur, there would be no alternative but that the city would be without gas for an indefinite period. I recommend and urge most strongly that immediate action be taken authorizing the department to take the necessary steps for the construction of a new holder. In placing additional boilers at the electric station, the space used for storing coal will have to be used for them. New storage must be provided. I recommend that the department be authorized to build a coal shed."

WE understand that the Animas Canal, Reservoir, Water, Power and Investment Company, of Durango, Col., is now installing a hydro-electric plant of considerable importance. The power house is located about 20 miles from Durango, at a point affording an effective head of 970 feet available through 2,800 feet of pipe. The initial installation will consist of two 2,250-kw. general electric generators, direct-connected to Pelton water wheels, but provision has been made in the dam and head-works for an ultimate development of 30,000-horse power. The present pipe line, one for the two units, is of sheet steel, varying in diameter from 44 inches at the upper end to 34 inches at the wheels, and of thicknesses from $\frac{3}{16}$-inch to $\frac{11}{16}$-inch. The pipe is all double buttstrap riveted, with triple riveting at the lower end, and is provided with flanged connections. The water wheel units, two in number, are of the "double-overhung" construction; each unit consisting of two Pelton wheels, one overhanging each end of the main shaft, with the engine type generator in the center. Needle nozzles are used which, operated by oil pressure, automatic governors, will insure accurate regulation and economy of water at all stages of load. The wheels are approximately 8 feet in diameter, with centers of cast steel, turned all over and fitted with Pelton buckets straddling the periphery and secured to same by means of turned steel bolts driven in reamed holes. The buckets are fine ground and machined inside to obtain the highest possible efficiency. Each wheel unit will have a maximum capacity of 4,000-horse power to provide for an overload on the generator.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.

NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, APRIL 24, 1905.

The Market for Gas Securities.

The market for city gas shares was weak since time of last writing, but it looks to us that the recorded low prices for Consolidated and Brooklyn Union are mainly the result of trading on the short side. Consolidated sold down to 198¾ and closed at 200, while Brooklyn Union is said to have been sold at 200. The speculator who would "short" Brooklyn Union must have plenty of nerve, or plenty of money. The quotations are up to the 20th inst., the Exchange being closed over the 21st and 22d. The main feature of the gas investigating committee's session for the week was some tests of candle power submitted on behalf of Counsellor Hughes. They were prepared by Prof. Hallock, of Columbia, and a "soph.," who, when their story was all told, finished up by admitting that a Jones jet photometer's flare had served as their comparing apparatus. Is it not to laugh? The outside market all favors the investor, especially in the instance of accredited bond issues. United Gas Improvement Company is 121½ bid. The sharp rise in these shares may be attributed to the fair knowledge of Philadelphia financiers that the authorities of Philadelphia and the Company have agreed upon terms for a long extension of the lease of the Philadelphia gas works.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

APRIL 24.

☞All communications will receive particular attention.

☞The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	199¾	200
Central Union, Bonds, 5's	3,000,000	1,000	108½	110
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Mutual	3,500,000	100	300	320
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. .. Bonds, 5's	11,000,000	1,000	112	113½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	.
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	..	..	.
Northern Union, Bonds, 5's.	1,250,000	1,000	104	106
New York and East River .. Bonds 1st 5's	3,500,000	1,000	112	114
" 1st Con. 5's	1,500,000	..	106½	108½
Standard	5,000,000	100	125	130
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	200	205
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	¼	⅜
" ncome Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	6	7
" " Bonds, 5's	5,250,000	1,000	66	68½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co	29,500,000	100	108½	109
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	97½	99
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89¼
Preferred	3,026,500	100	107½	109
Consumers, Toronto	,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	88	89
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	89½	92
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	104½	105½
" Bonds, 5's	10,500,000	..	107	108
Indianapolis	2,000,000	..	70	75
" Bonds, 6's	2,650,000	..	106½	108
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,823,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	80
Preferred	2,500,000	100	100	105
Bonds	10,000,000	1,000	108½	109
Lafayette Gas Co., Ind	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	109½	109¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	164	
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	58½	58¾
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	94	96
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	.
Washington, D. C	2,600,000	20	340	342
First mortgage 6's	600,000	..	..	..
Western, Milwaukee,	4,000,000	..	..	..
Wilmington, Del	600,000	50	280	.

Advertisers' Index.

GAS ENGINEERS. Page

A. E. Boardman, New York City ... 663
Baxter & Young, Detroit, Mich ... 671
B. E. Chollar, St. Louis, Mo ... 669
David Leavitt Hough, New York City ... 668
Davis & Farnum Mfg. Co., Waltham, Mass ... 672
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
Frank D. Moses, Trenton, N. J ... 663
Fred. Bredel Co., Milwaukee, Wis ... 670
Frederic Egner, Washington, D. C ... 664
Geo. R. Rowland, New York City ... 664
Humphreys & Glasgow, New York City ... 673
Isbell-Porter Co., Newark, N J ... 674
J. Alex. Mayers, New York City ... 675
J. F. W. Jost, Philadelphia, Pa ... 668
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 672
The Gas Machinery Co., Cleveland, O ... 669
The Jeffrey Manufacturing Co., Columbus, O ... 670
The Western Gas Construction Co., Fort Wayne, Ind ... 640
United Gas Improvement Co., Philadelphia, Pa ... 667

GAS WORKS APPARATUS AND CONSTRUCTION.

A. E. Boardman, New York City ... 663
Bartlett, Hayward & Co., Baltimore, Md ... 673
Baxter & Young, Detroit, Mich ... 671
Connelly Iron Sponge and Governor Co., New York City 669
Continental Iron Works, Brooklyn, N. Y ... 674
Cruse-Kemper Co., Philadelphia, Pa ... 669
Davis and Farnum Mfg. Co., Waltham, Mass ... 672
Deily & Fowler, Philadelphia, Pa ... 676
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
Empire Gas Construction & Improvement Co., N. Y. City 662
Frank D. Moses, Trenton, N. J ... 663
Fred. Bredel Co., Milwaukee, Wis ... 670
G. Shepard Page's Sons, New York City ... 671
Humphreys & Glasgow, New York City ... 673
Isbell-Porter Company, New York City ... 674
J. Alex. Mayers, New York City ... 675
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 679
Lloyd Construction Co., Detroit, Mich ... 662
Logan Iron Works, Brooklyn, N. Y ... 676
Quintard Iron Works, New York City ... 673
R. D. Wood & Co., Philadelphia, Pa ... 674
Riter-Conley Mfg. Co., Pittsburgh, Pa ... 675
Stacey Mfg. Co., Cincinnati, O ... 675
The Gas Machinery Co., Cleveland, O ... 669
The Jeffrey Manufacturing Co., Columbus, O ... 670
The Western Gas Construction Co., Fort Wayne, Ind ... 640
United Gas Improvement Co., Philadelphia, Pa ... 667

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md ... 673
B. E. Chollar, St. Louis, Mo ... 669
Economical Gas Apparatus Construct'n Co, Toronto, Ont. 668
Fred. Bredel Co., Milwaukee, Wis ... 670
Humphreys & Glasgow, New York City ... 673
The Gas Machinery Co., Cleveland, O ... 669
The Western Gas Construction Co., Fort Wayne, Ind ... 640
United Gas Improvement Co., Philadelphia, Pa ... 667

SCRUBBERS AND CONDENSERS.

Continental Iron Works, Brooklyn, N.Y ... 674
Davis & Farnum Mfg. Co., Waltham, Mass ... 672
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
Fred. Bredel Co., Milwaukee, Wis ... 670
Isbell-Porter Co., Newark, N. J ... 674
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 672
Logan Iron Works, Brooklyn, N. Y ... 676
R. D. Wood & Co., Philadelphia, Pa ... 674
Riter-Conley Mfg. Co., Pittsburgh, Pa ... 675
Stacey Mfg. Co., Cincinnati, O ... 675
The Gas Machinery Co., Cleveland, O ... 669
The Western Gas Construction Co., Fort Wayne, Ind ... 640

PRODUCER POWER PLANTS.

Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
R. D. Wood & Co., Philadelphia, Pa ... 674

TAR AND CARBONIC ACID EXTRACTOR.

Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
Fred. Bredel Co., Milwaukee, Wis ... 670
Isbell-Porter Co., Newark, N. J ... 674
Stacey Mfg. Co., Cincinnati, O ... 675
The Gas Machinery Co., Cleveland, O ... 669
The Western Gas Construction Co., Fort Wayne, Ind ... 640

AMMONIA CONCENTRATORS.

Fred. Bredel Co., Milwaukee, Wis ... 670
Michigan Ammonia Works, Detroit, Mich ... 655
The Gas Machinery Co., Cleveland, O ... 669
The Western Gas Construction Co., Fort Wayne, Ind ... 640

GAS METERS.

American Meter Co., New York and Philadelphia..... 679
Detroit Meter Company, Detroit, Mich..... 639
D. McDonald & Co., Albany, N.Y..... 677
Helme & McIlhenny, Philadelphia, Pa..... 679
John J. Griffin & Co., Philadelphia, Pa..... 680
Keystone Meter Co., Royersford, Pa..... 678
Maryland Meter and Mfg. Co., Baltimore, Md..... 678
Metric Metal Co., Erie, Pa..... 679
Nathaniel Tufts Meter Co., Boston, Mass..... 678
Pittsburgh Meter Co., Pittsburgh, Pa..... 677

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia..... 679
D. McDonald & Co., Albany, N. Y..... 677
Helme & McIlhenny, Philadelphia, Pa..... 679
John J. Griffin & Co., Philadelphia, Pa..... 680
Keystone Meter Co., Royersford, Pa..... 678
Nathaniel Tufts Meter Co., Boston, Mass..... 678
Pittsburgh Meter Co., Pittsburgh, Pa..... 677

PREPAYMENT METER ATTACHMENTS.

Reeves Mfg. Co., New Haven, Conn..... 672

GAS AND WATER PIPES.

Charles Millar & Son Co., Utica, N. Y..... 644
Davis & Farnum Mfg. Co., Waltham, Mass..... 672
Donaldson Iron Co., Emaus, Pa..... 661
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
R. D. Wood & Co., Philadelphia, Pa..... 674
Warren Foundry and Machine Co., New York City..... 664

GAS COALS.

Berwind-White Coal Mining Co., New York and Phila. 670
Perkins & Co., New York City..... 670
Westmoreland Coal Co., Philadelphia, Pa..... 671

SPECIALTIES FOR OIL AND PIPE LINES.

S. R. Dresser, Bradford, Pa..... 661

GAS MAIN STOPPERS.

Safety Gas Main Stopper Co., N.Y. City..... 664

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y..... 635

GAS TAPPING MACHINES.

George Light, Dayton, O..... 664
H. Mueller Manufacturing Company, Decatur, Ills..... 662

CANNEL COALS.

Perkins & Co., New York City..... 670

STOKING MACHINERY.

G. A. Bronder, New York City..... 669

CONVEYORS.

Adam Weber Sons, New York City..... 663
C. W. Hunt Company, New York City..... 660
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
Fred. Bredel Co., Milwaukee, Wis..... 670
G. A. Bronder, New York City..... 669
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 672
The Brown Hoisting Machinery Co., Cleveland, O..... 671
The Gas Machinery Co., Cleveland, O..... 660
The Jeffrey Manufacturing Co., Columbus, O..... 670
The Link-Belt Engineering Co., Philadelphia, Pa..... 661
The Link-Belt Machinery Co., Chicago, Ills..... 664
The Western Gas Construction Co., Fort Wayne, Ind.. 640

CHARGING BARROWS & COAL WAGONS.

Davis & Farnum Mfg. Co., Waltham, Mass..... 672
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 672
Stacey Mfg. Co., Cincinnati, O..... 675

GAS ENRICHERS.

Standard Oil Co., New York City..... 631
Sun Company, Pittsburgh, Pa..... 671
The Sun Oil Co., Pittsburgh, Pa..... 671

COKE CRUSHERS.

C. M. Keller, Columbus, Ind..... 671
Fred. Bredel Co., Milwaukee, Wis..... 670
The Jeffrey Manufacturing Co., Columbus, O..... 670

STEAM BLOWER FOR BURNING BREEZE.

De Laval Steam Turbine Co., Trenton, N. J..... 656

(Continued on page 656.)

STOCKHOLDERS' MEETING.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., April 13, 1905.

The Annual Meeting of the Stockholders of The United Gas Improvement Company will be held at the office of the Company, N. W. Corner of BROAD AND ARCH STREETS, PHILADELPHIA, Monday, May 1st, at 12 o'clock, noon, when an election will be held for a President and six (6) Directors, to serve for the ensuing year, and such other business transacted as may be brought before the meeting.

The stock transfer books will be closed from 3 P.M., Wednesday, April 19th, until 10 A.M., Tuesday, May 2d.

1558-2 W. F. DOUTHIRT, Secretary.

NOTICE!

PLEASE read the advertisement of the Empire Gas Improvement and Construction Company, on page 661. This Company employs only high-priced and quick-working mechanics, and all its work is guaranteed to be strictly first class, and will be finished at time specified. A. M. SUTHERLAND,

1545-eot. tf. 49 Wall Street.

POSITION WANTED

As Superintendent of a Medium-Sized Gas Works.

Present position, manager and superintendent. Thoroughly understands both coal and water gas manufacture. Eight years' experience, divided between construction, operation and manufacture. Best of references from present employers and others. Address, "SUPERINTENDENT,"

1558-5 Care this Journal.

Position Wanted

AS SUPERINTENDENT or MANAGER,

By a young and active man, who has had 7 years' experience in the gas business; 4 years as superintendent in a town of 30,000.

Address, "A. W. B.,"

1559-4 Care this Journal.

Situation Wanted.

A young man of many years' experience in the various branches of the gas business is open for engagement. Must be located by April 30th. Able to furnish A-1 references.

1559-1 Address, "HUSTLER," care this Journal.

POSITION WANTED

As superintendent by a first-class gas engineer and successful hustler for new business. Also, experienced in selling gas stoves, laying high and low pressure gas mains. Understands the manufacture of coal and water gas in detail, also reconstruction of benches and water gas apparatus. Superintendent of gas company for a number of years. Will find me up-to-date and energetic young man. Can furnish best of references. Address, "HUSTLER, No. 2,"

1559-2 Care this Journal.

Position Wanted

FOR CAPABLE ENGINEER,

Experienced in gas works construction, and who can get results in manufacture, distribution and new business.

1557-4 Address, "DEVELOPER," care this Journal.

Position Wanted

As Manager or Superintendent of Gas or Gas and Electric Property,

By man of large experience in all details of manufacturing, distributing and developing of new business. References furnished. Address, "C. B.,"

1556-4 Care this Journal.

DRAUCHTSMAN

Wanted immediately. Must be first-class and experienced in retort house drawings. Permanent position. State salary expected.

Address, "J. M. W.,"

1555-6 Care this Journal.

WANTED,

An Experienced Tar Distiller.

Address, with references and stating experience and salary expected,

"A. H. B.,"

1559-4 Care this Journal.

WANTED,

Works' Foreman.

An experienced, reliable man in a works producing 120 million cubic feet per annum. Must be energetic and strictly sober, have a good knowledge of coal and water gas manufacture and be competent to handle workmen. Apply in own handwriting, stating age, experience and wages expected, "BOX H. O.," care this Journal.

1559-1

WANTED,

Salesman having Experience in the Pitch and Roofing Trade.

Address, with references and stating experience and salary expected,

"A. H. B.,"

1559-4 Care this Journal.

WANTED,

Two Second-Hand Purifier Boxes,

In good condition, with chain lift and center-seal, capable of handling 40,000 cubic feet of gas daily. Address, "PURIFIERS,"

1559-4 Care this Journal.

WANTED,

A 6 or 7-Foot Station Meter,

Second-hand. It must be in good repair and admit of fitting with a Hinman drum.

Address, SPRINGFIELD GAS AND ELECTRIC CO.,

1559-3 Springfield, Mo.

WANTED,

Purifier Boxes

Of 150 or 200 square feet area each; 24-inch seals. Address, "C. E. G.,"

1559-1 Care this Journal.

Patent Rights for Sale.

Archibald Little's British Patent (No. 24,995, 1903). German and American Patents Applied for.

We are open to receive offers for the control of this patent in the United States, either on the basis of royalty or purchase outright. The patent is for inclined retorts, and the cost of the building is 30 per cent. less than for the standard inclined retort bench.

Apply to ARCHIBALD LITTLE,

New Conveyor Co., Limited,

1557-4 Smethwick-near-Birmingham, England.

FOR SALE,

One 10-Horse Power Otto Gas Engine, Tank and Batteries,

Latest style; used six months. Address, the

SARATOGA GAS, ELECTRIC LIGHT & POWER CO.,

1545-tf Saratoga Springs, N. Y.

GASHOLDER FOR SALE.

We have a 31,000 cubic foot holder (50 feet in diameter) for sale. Holder is in brick tank. Erected by Deily & Fowler.

KALAMAZOO GAS COMPANY,

1552-tf KALAMAZOO, MICH.

FOR SALE,

The following second-hand gas works apparatus and fixtures:

One No. 2 Root Exhauster, 6-inch connections; engine on base of same; in good shape.

One 4-Foot American Station Meter (in bad repair, but frame all right), for 6-inch connections.

Two Sets Castings, complete, for two benches of 6's; all for 7-inch connections.

Two Sets Castings, complete, for two benches of 6's; all for self-sealing mouthpieces; nearly new.

One Connelly Street Governor, 6-inch connections.

All the above we offer were in service up to a short time ago, being displaced when we built an entirely new plant. Here is an opportunity to buy material at a bargain.

1555-6 IOWA CITY GAS LIGHT CO., Iowa City, Ia.

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 101 in use. Write to

STROH & OSIUS, Patentees, or

MICHIGAN AMMONIA WORKS, - Detroit, Mich.

(Concluded from page 655.)

ECONOMIZERS.

Green Fuel Economizer Co., Matteawan, N.Y. 656

GAS GAUGES.

The Bristol Co., Waterbury, Conn. 660

GAS GOVERNORS.

Connelly Iron Sponge and Governor Co., New York City 669
Fred. Bredel Co., Milwaukee, Wis. 670
Isbell-Porter Co., Newark, N. J. 674
Johnson-Reynolds Co., Anderson, Ind. 658
R. D. Wood & Co., Philadelphia, Pa. 674

CEMENTS.

C. L. Gerould, Bloomington, Ind. 668

RETORTS AND FIREBRICKS.

Adam Weber Sons, New York City. 668
Baltimore Retort and Firebrick Co., Baltimore, Md. 668
Brooklyn Firebrick Works, Brooklyn, N. Y. 668
Harbison-Walker Refractories Co., Pittsburgh, Pa. 658
Henry Maurer & Son, New York City 668
James Gardner, Jr., Co., Pittsburgh, Pa. 668
J. H. Gautier & Co., Jersey City, N. J. 668
Laclede Firebrick Mfg. Co., St. Louis, Mo. 657
National Pyrogranit Co., New York City. 668
Missouri Firebrick Co., St. Louis, Mo. 668
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 658

INCLINED RETORTS.

Adam Weber Sons (Graham, Morton [England] System) 668
Fred. Bredel Co., Milwaukee, Wis. 660
Geo. G. Ramsdell, New York City 617
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 658

VERTICAL S'S.

Adam Weber Sons (Oscar B. Weber's Construction) 668
Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 669
Fred. Bredel Co., Milwaukee, Wis. 67
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 658

VERTICAL RETORTS, CHARGING AND DISCHARGING VERTICALLY.

Adam Weber Sons, New York City 668

REGENERATIVE FURNACES.

Adam Weber Sons, New York City 668
Bartlett, Hayward & Co., Baltimore, Md. 674
Fred. Bredel Co., Milwaukee, Wis. 670
J. H. Gautier & Co., Jersey City, N. J. 668
Laclede Firebrick Mfg. Co., St. Louis, Mo. 657
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 658

SELF-SEALING MOUTHPIECE DOORS.

Continental Iron Works, Brooklyn, N.Y. 674
Davis & Farnum Mfg. Co., Waltham, Mass. 672
Fred. Bredel Co., Milwaukee, Wis. 670
Isbell-Porter Co., Newark, N. J. 674
Kerr Murray Mfg. Co., Fort Wayne, Ind. 672
Logan Iron Works, Brooklyn, N.Y. 676
R. D. Wood & Co., Philadelphia, Pa. 674
Stacey Mfg. Co., Cincinnati, O. 675
The Gas Machinery Co., Cleveland, O. 660
The Western Gas Construction Co., Fort Wayne, Ind. ... 640

CHIMNEY CONSTRUCTION.

Adam Weber Sons, New York City. 668

INCANDESCENT GAS LAMPS.

Central Lighting Co., New York City 659
D. M. Steward Mfg. Co., Chattanooga, Tenn. 657
General Gas Light Co., Kalamazoo, Mich. 659
Geo. G. Ramsdell, New York City 617
Welsbach Company, Gloucester, N. J. 666

BURNERS.

Central Lighting Co., New York City 659
D. M. Steward Mfg. Co., Chattanooga, Tenn. 657
Wm. M. Crane Co., New York City. 661

LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn. 657

STREET LAMPS.

Thos. T. W. Miner, New York City 666
Welsbach Street Lighting Co., New York and Phila. 661

PURIFIERS.

Connelly Iron Sponge and Governor Co., New York City. 669
Davis & Farnum Mfg. Co., Waltham, Mass. 672
Fred. Bredel Co., Milwaukee, Wis. 670
Isbell-Porter Co., Newark, N. J. 674
Kerr Murray Mfg. Co., Fort Wayne, Ind. 672
R. D. Wood & Co., Philadelphia, Pa. 674
Stacey Mfg. Co., Cincinnati, O. 675
The Western Gas Construction Co., Fort Wayne, Ind. ... 640

PURIFYING MATERIALS.

Connelly Iron Sponge and Governor Co., New York City 669

VALVES.

Continental Iron Works, Brooklyn, N. Y. 674
Davis & Farnum Mfg. Co., Waltham, Mass. 672
Economical Gas Apparatus Construct'n Co., Toronto, Ont 668
Isbell-Porter Co., Newark, N. J. 674
Kerr Murray Mfg. Co., Fort Wayne, Ind 672
Ludlow Valve Manufacturing Co., Troy, N.Y. 661
R. D. Wood & Co., Philadelphia, Pa. 674
Stacey Mfg. Co., Cincinnati, O. 675
The P. H. & F. M. Roots Co., Connersville, Ind. 663
The Western Gas Construction Co., Fort Wayne, Ind. 640

PUMPS.

De Laval Steam Turbine Co., Trenton, N. J. 656

EXHAUSTERS.

Connelly Iron Sponge and Governor Co., New York City 669
Davis & Farnum Mfg. Co., Waltham, Mass. 672
Isbell-Porter Company, Newark, N. J. 674
Kerr Murray Mfg. Co., Fort Wayne, Ind. 672
The P. H. & F. M. Roots Co., Connersville, Ind. 663

PURIFIER SCREENS.

John Cabot, Hoboken, N. J. 660

GRATE BARS.

F. Ferguson & Son, Hoboken, N. J. 664

GAS STOVES.

American Meter Co., New York and Philadelphia. 679
Detroit Stove Works, Detroit and Chicago. 678
Keystone Meter Co., Royersford, Pa. 678
Maryland Meter & Manufacturing Co., Baltimore, Md. . 678
Nathaniel Tufts Meter Co., Boston, Mass. 678

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich. 660

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N.Y. 661

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md. 674
Continental Iron Works, Brooklyn, N.Y. 674
Cruse-Kemper Co., Philadelphia, Pa. 660
Davis & Farnum Mfg Co., Waltham, Mass. 672
Deily & Fowler, Philadelphia, Pa. 668
Economical Gas Apparatus Construct'n Co., Toronto, Ont. 668
Kerr Murray Mfg. Co., Fort Wayne, Ind. 672
Logan Iron Works, Brooklyn, N.Y. 676
R. D. Wood & Co., Philadelphia, Pa. 674
Riter-Conley Mfg. Co., Pittsburgh, Pa. 675
Stacey Mfg. Co., Cincinnati, O. 675

STORAGE TANKS.

Davis & Farnum Mfg. Co., Waltham, Mass. 672
Stacey Mfg. Co., Cincinnati, O. 675

PAINTS.

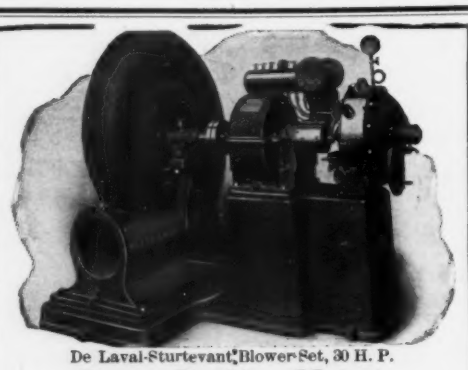
American Standard Composition Co., New York City... 659

PATENTS, TRADE-MARKS, COPYRIGHTS.

Royal E. Burnham, Washington, D. C. 660

STEAM TURBINES.

De Laval Steam Turbine Co., Trenton, N. J. 656



De Laval-Sturtevant Blower Set, 30 H. P.

Steam Turbine Motors
Steam Turbine Dynamos
Steam Turbine Blowers
Steam Turbine Centrifugal Pumps
Electro-Motor Centrifugal Pumps

SEND FOR CATALOGUE.

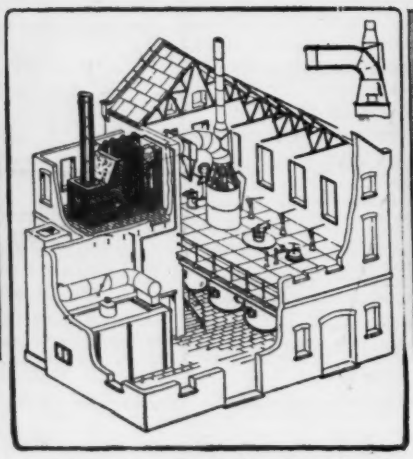
REPRESENTATIVES:

D'Olier Engineering Co., - New York City, Philadelphia, Pa.
Chas. Garrison, - - - - - Boston, Mass.
The Turbine Engineering Co., - New York City, Chicago, Ill.
Denver Engineering Works Co., - - - - Denver, Col.
Florida Electric Co., - - - - Jacksonville, Florida.
Dravo, Doyle & Co., - - - - - Pittsburg, Pa.
Geo. P. Dravo, - - - - - Milwaukee, Wis.
Chester B. Davis, - - - - - Dallas, Texas.
Joshua Hendy Machine Works, - - - San Francisco, Cal.
Kilbourne & Clark Co., - - - Seattle, Wash.

DE LAVAL STEAM TURBINE COMPANY
Works and Sales Offices, TRENTON, N. J.

GREEN'S ECONOMIZER

WE BUILD INSTALL MECHANICAL DRAFT PLANTS



FANS
BLOWERS
EXHAUSTERS
PRESSURE
BLOWERS
ETC.

25 Per Cent.
Saving in Fuel.

25 Per Cent.
Increased Boiler Capacity.

Our Expert Advice Free.

Installation in Poughkeepsie works, where it is saving this amount of fuel, and at the same time increasing the boiler efficiency as stated.

Send for Catalog.

THE GREEN FUEL ECONOMIZER CO., MATTEAWAN, N. Y.

THE BEST are THE CHEAPEST.

HOMOGENEOUS CONSTRUCTION ~ PERFECT FINISH ~ LONGEST CONTINUOUS LIFE.

WE HAVE RETORTS MAKING GAS TO-DAY THAT HAVE BEEN IN CONSTANT USE FOR 52 MONTHS.

Awarded the Only **GRAND PRIZES** At St. Louis Exposition

BY A JURY COMPOSED OF THE MOST COMPETENT ENGINEERS OF FOUR CONTINENTS, FOR SUPERIOR

RETORTS * GAS BENCHES * FIREBRICK.

Designs and Estimates Cheerfully Furnished.

LACLEDE FIREBRICK MANUFACTURING COMPANY,

ST. LOUIS, MO.

ARE YOU MARRIED to any other burner?

If not, please give us an opportunity to get your orders. Tell us what your pressure is and we will send you samples which we know will please you. Steward Burners are made for 8-10, 12-10, 15-10, 20-10, 25-10 or 30-10 pressure, and in sizes from 2-foot to 8-foot.

D. M. STEWARD MFG. CO., Est. 1876, CHATTANOOGA, TENN.

SCIENTIFIC BOOKS.

ELECTRIC GAS LIGHTING. By H. S. Norrie. 50 cents.

GAS ANALYST'S MANUAL. By J. Abady. $6.50.

COX'S GAS FLOW COMPUTER. $2.50.

FIELD'S ANALYSIS, 1903. $5.

GAS AND GAS WORKS. By Hughes and O'Connor. $2.40

POOLE ON FUELS. By Herman Poole. $3.

GAS ENGINEER'S POCKET-BOOK. By Henry O'Connor $3.50.

TECHNICAL GAS ANALYSIS. By Winkler & Lunge. $4.

GAS CONSUMER'S HANDYBOOK, by Wm. Richards. 20 cents.

PRACTICAL TREATISE ON HEAT. By Thomas Box. 2d edition. $5.

PRACTICAL PHOTOMETRY: A Guide to the Study of the Measurement of Light. By W. J. Dibdin. $3.

CHEMICAL TECHNOLOGY: Vol. I., *Fuel and Its Applications*, $5. Vol. II., *Lighting*, $4.

IRONWORK: Practical Designing of Structural Ironwork. By H. Adams. $3.50.

HEMPEL'S GAS ANALYSIS, $2.25.

SELF-INSTRUCTION FOR STUDENTS IN GAS MANUFACTURE. $1.25.

LIQUID FUEL FOR MECHANICAL AND INDUSTRIAL PURPOSES. By E. A. Brayley Hodgetts. $2.50.

PRACTICAL HANDBOOK ON GAS ENGINES, by G. Lieckfeld. $1.

HEAT A MODE OF MOTION. By John Tyndall. $2.50.

THEORY OF HEAT. By J. Clerk-Maxwell. $1.50.

MANUAL FOR GAS ENGINEERING STUDENTS. By D. Lee. 40 cents.

AMMONIA AND AMMONIUM COMPOUNDS. By Dr. R. Arnold. $2.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS. By D. A. Graham. $3.

A TEXT BOOK OF INORGANIC CHEMISTRY. By Prof. Victor Von Richter. $2.

ILLUMINATING AND HEATING GAS. By W. Burns. $1.50

HANDBOOK FOR MECHANICAL ENGINEERS. By H. Adams. $2.50.

TREATISE ON MASONRY CONSTRUCTION. Baker. $5.

GAS ENGINEER'S LABORATORY HANDBOOK. By Jno. Hornby. $2.50.

FINANCES OF GAS AND ELECTRICITY MANUFACTURING ENTERPRISES. By Wm. D. Marks. $1.

PRACTICAL PLUMBING. By P. J. Davies. Vol. I. $3, Vol. II. $4.50.

AMERICAN SANITARY PLUMBING. By James J. Lawler. $2.

A COMPARISON BETWEEN THE ENGLISH AND FRENCH METHODS OF ASCERTAINING THE ILLUMINATING POWER OF COAL GAS. $1.60.

ELECTRICITY.

INDUSTRIAL PHOTOMETRY, with Special Application of Electric Lighting. By A. Palaz, Sc.D. $4.

ELEMENTS OF ELECTRIC LIGHTING, Including Electric Generation, Measurement, Storage and Distribution. By Philip Atkinson. $1.50.

ELECTRIC TRANSMISSION OF ENERGY. By G. Kapp. $3.50.

ELECTRICIAN'S POCKET-BOOK. By Monroe and Jamieson. $2.50.

DYNAMO BUILDING. By F. W. Walker. 50 cents.

DOMESTIC ELECTRICITY FOR AMATEURS. By E. Hospitalier. $2.50.

PRACTICAL MANAGEMENT OF DYNAMOS AND MOTORS. $1.

PRACTICAL GUIDE TO THE TESTING OF INSULATED WIRES AND CABLES. $1.

ELECTRIC LIGHTING, by Francis B. Crocker. $3.

ELECTRIC LIGHT FITTING. $2.

PRACTICAL ELECTRICITY. $2.50.

ELECTRICITY FOR ENGINEERS. $2.50.

ELECTRICITY, Its Theory, Sources and Applications. By John T. Sprague. $6.

The above will be forwarded upon receipt of price. If sent by mail or express, postage or express charges must be added to above prices. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order. No books sent C.O.D.

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK.

PARKER-RUSSELL MINING AND MFG. CO.,

OF ST. LOUIS, MO.,

PROPRIETORS OF THE

OAK HILL GAS RETORT AND FIREBRICK WORKS.

ST. LOUIS OFFICE: 417 Pine Street. NEW YORK OFFICE: Aldrich Court, 45 Broadway.

WE MAKE A SPECIALTY OF WATER GAS LININGS AND CHECKER BRICK.

Half and Full Depth Benches of Our Own Design, Containing 6, 8 or 9 Retorts.

SLOPERS.--We have perfected plans of INCLINED RETORT BENCHES, designed to meet conditions prevailing in America, and constructed entirely of American materials.

We Build Benches Complete. Ready for Gas Making. Also,

RETORT HOUSES,

COAL and COKE CONVEYING MACHINERY.

Plans, Specifications and Estimates Cheerfully Furnished.

CORRESPONDENCE SOLICITED.

ALL CONTRACTS MADE AS OF ST. LOUIS, MO.

Gold Medals awarded by the Louisiana Purchase Exposition at St. Louis, for fireclay gas retorts, gas retort benches, firebrick and setting tiles.

HARBISON-WALKER REFRACTORIES COMPANY,

Farmers Bank Building, Pittsburg, Pa.

REPRESENTING

HARBISON-WALKER CO.
PHILIPSBURG FIREBRICK CO.
CLEARFIELD FIREBRICK CO.
BASIC BRICK COMPANY,
CLINTON COUNTY F. B. CO.
FREDERICKS MUNRO CO.
WALLACETON FIREBRICK CO.

MANUFACTURERS OF

HIGH GRADE FIREBRICK

For Gas Plant Construction,

Chrome, Magnesia, and Silica Brick,

Ground Fireclay, Silica Cement, Dead Burned Magnesia and Chrome Ore.

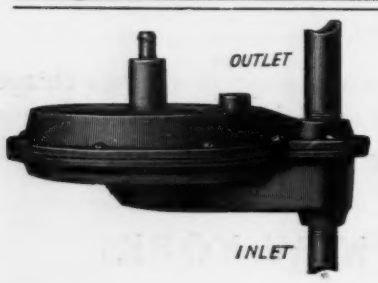
We Carry in stock constantly at our various works a complete line of shapes in the following well-known brands:

BENEZET, WOODLAND, H. & W. SPECIAL, CLEARFIELD, WIGTON STEEL, WALLACE, MUNRO EUREKA, TYRONE, "W. F. B." CORNING. CLINTON.

For use in every line of work in which refractory Material is required.

Catalogues will be furnished upon application. - - - Correspondence and trial orders solicited.

(In writing, kindly mention this Journal.)



REYNOLDS HIGH PRESSURE GAS GOVERNORS.

Our Governors Reduce 30 or 40 Pounds Pressure to 2 Inches Water Pressure.

WE MAKE ALL SIZES OF

DOUBLE DISTRICT GOVERNORS, INDIVIDUAL HOUSE SERVICE AND LOW PRESSURE GOVERNORS.

Write for Catalogue and State what you Need.

JOHNSON-REYNOLDS CO.,

ANDERSON, IND., U. S. A.

FACTORY LIGHTING

Has been gradually dropping away from the gas company.

It isn't beyond recall. Take the

Humphrey Enameled Factory Lamp,

fit up a few samples, talk lighting with your local manufacturers whenever you have any spare time this summer, and results in the fall will be gratifying.

GENERAL GAS LIGHT CO.,

Kalamazoo, Mich.

NEW YORK: 54 Warren St. **SAN FRANCISCO: 530 Market St.**

The "Air-Light"

Premier Burner Of America.

GENUINE "AIR-LIGHTS,"

A NEW BURNER FOR 1905.

AGENTS WANTED EVERYWHERE.

Increased in Value. Decreased in Price.

DENAYROUZE TRADE MARK AIR-LIGHT REGISTERED PAT 673705 MAY 7 1901

A High-Class Burner, a Rapid Seller, and a Money Maker for Agents, Dealers, Gas Companies, etc.

CENTRAL LIGHTING CO., 86 Warren Street, New York, N. Y.

Write or Call for Prices and Particulars.

THE AMERICAN STANDARD COMPOSITION CO.

—) MANUFACTURES (—

HEAT PROOF AND DAMP PROOF PAINTS

For Structural Iron and Steel, Gas Apparatus, Underground Piping, Boiler Fronts, Stacks, etc.

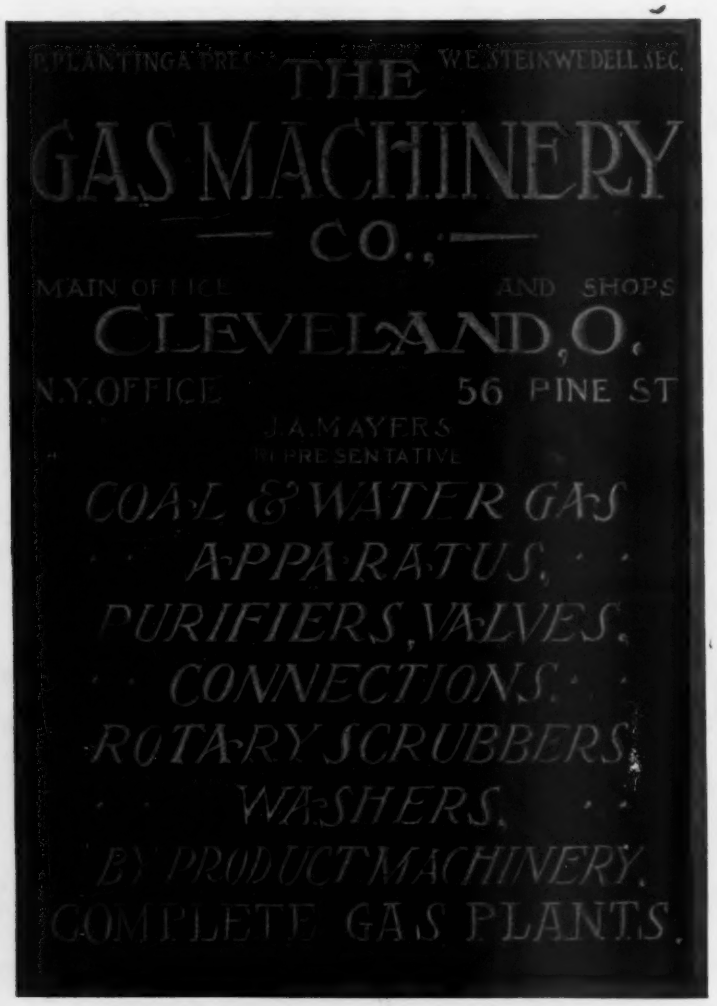
Our Paints will not crack, peel or scale. Heat does not affect them. They are moisture proof.

They are the Paints that Don't Come Off!

We let you Try before you Buy. Send for samples and prices.

AMERICAN STANDARD COMPOSITION COMPANY,

1707, Wall Street Exchange Building, New York.



This is No. 2.

Height, 36 inches.
Diameter, 12 "
Shipping weight, 80 lbs.
Net weight, 50 lbs.
The products of combustion are entirely separate from the water. Entire water surfaces are tinned.

Price, $35.00.

HOT WATER

FOR BATHROOM AND KITCHEN

is most easily, quickly and economically supplied by a

Humphrey Crescent Instantaneous Water Heater.

Prices range from $20 to $45.
Every Heater GUARANTEED.

Set a heater for every gas consumer. You will please them and increase sale of gas at the same time.

Send to-day for catalogue and discounts to

HUMPHREY CO.,
Kalamazoo, Mich.,

The only manufacturers in the World of a COMPLETE LINE OF INSTANTANEOUS WATER HEATERS.

Coal Tar Naphtha { Replaces expensive xylene and alcohol for removing naphthaline stoppages or deposits in gas mains.

BARRETT MFG. CO., PHILADELPHIA.

1552-3mos

PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C

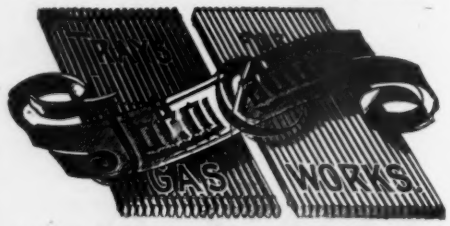
Send for Pamphlet on Patents.

1448-tf

Church's Patent Trays.

Reversible; Strongest; Most Easily Repaired.

Special Trays for Iron Sponge.



1412-1416 Adams Street, Hoboken, N. J.

We also Supply the Cheapest and Strongest

•Reversible Bolted Trays•

IN THE MARKET.

SEND FOR BOOKLET AND CIRCULARS.

"THE MINER"

Globe Street and Boulevard Lamps.

Cheapest and Best

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

Send for Catalogues.

THOMAS T. W. MINER,

821-823 Eagle Av., N.Y.

GOAL HANDLING.

We make Mast and Gaff Iron Fittings for gas companies, coal dealers and manufacturers. Made in two sizes and kept in stock, ready for prompt delivery.

C. W. Hunt Company,

BODINE STREET, WEST NEW BRIGHTON, N. Y.

Bristol's Recording

PRESSURE GAUGE.

For continuous records of Street Gas Pressure.

Simple in construction, accurate in operation and low in price.

Fully Guaranteed. Send for Circulars.

THE BRISTOL CO.,

Waterbury, Conn.

Gold Medal, St. Louis Exposition.

Gas Engineer's Pocket-book, HENRY O'CONNOR,

Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50. For Sale by

A. M. CALLENDER & CO., 42 Pine St., N.Y. City.

You can buy burners
that cost less than

BRAY BURNERS,

But all you save on the first cost will be lost a hundred times over in the increased number of complaints and dissatisfied consumers.

DON'T PUT GOOD GAS IN THE HOLDER AND SPOIL IT AT THE BURNER.

BRAY BURNERS

Have been used by the largest Gas Companies for over forty years, because

THE PROGRESSIVE GAS MAN ONLY WANTS THE BEST.

W. M. CRANE COMPANY,
NEW YORK,

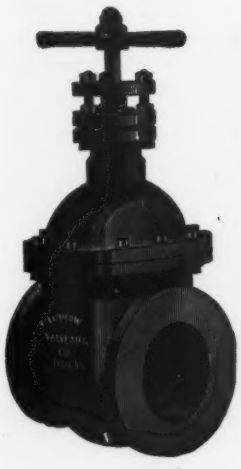
Have you a Bray Blue Book? SOLE AGENTS FOR THE UNITED STATES.

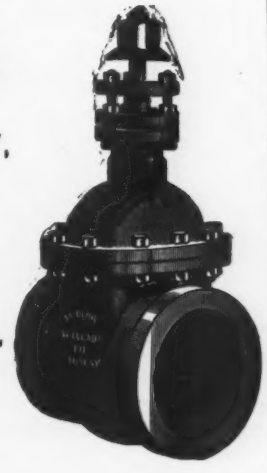
THE
Ludlow Valve Mfg. Co.,
TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.





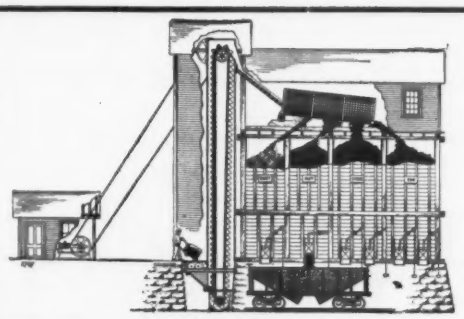
HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

COKE
Crushing and Screening
PLANT

Erected in 1903 for Keystone Coal and Coke Co., Greensburg, Pa.

Let us make suggestions fitted to your problem. Our practice is to use the standard designs that best conform to the demands of the work to be done. We will demonstrate the economy of our machinery, or advise you against it.



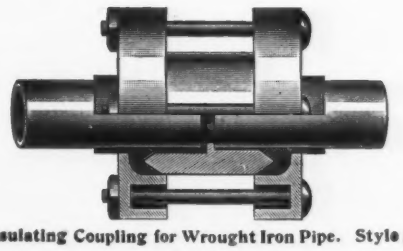
LINK-BELT ENGINEERING COMPANY,
Philadelphia.

NEW YORK: 49 Dey St.
PITTSBURG: Park Bldg.
CHICAGO: Link-Belt Machinery Co.

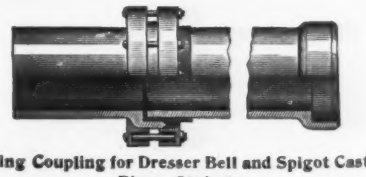
S. R. DRESSER,

BRADFORD, PENNSYLVANIA, U. S. A.,

Patentee and Manufacturer of Specialties for Oil and Gas Lines.

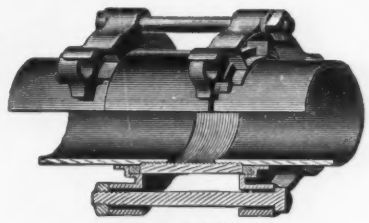


Insulating Coupling for Wrought Iron Pipe. Style 3.

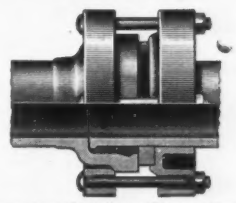


Insulating Coupling for Dresser Bell and Spigot Cast Iron Pipe. Style 6.

Regular Sleeve. Style 2.



Clamp. Style 4.



Clamps for Cast Iron Pipe. Style 4½.

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

My Insulating Coupling prevents the destruction of pipe by electrolytic action, in either water or gas lines.

SEND FOR CATALOGUE.

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO.

This Company has purchased the patents and goodwill in the business hitherto carried on and owned by *A. M. Sutherland.* It is now ready to contract for the erection and installation of

ENTIRE GAS WORKS,

or any separate portion of the same, such as **Gasholders, Coal Gas Benches, Lowe-Sutherland** double-superheater **Water Gas Sets,** Scrubbers, Condensers, Exhausters, Purifying Boxes, Street Governors, Street Mains and Main Laying.

The high character of the work done by A. M. Sutherland during the past 15 years will be strictly adhered to and all work is warranted.

Mr. Sutherland remains with the Company for two years President and Director, and will give personal attention to contracts.

EMPIRE GAS IMPROVEMENT AND CONSTRUCTION CO., 49 Wall St., New York.

Lloyd's Rubber Lute

Or Positive Joint.

Patented November 8th, 1904, No. 774,439.

ONLY LICENSED BUILDERS:

Bartlett, Hayward & Co., Baltimore, Md.
Isbell-Porter Co., Newark, N. J.
Stacey Manufacturing Co., Cincinnati, O.
Lloyd Construction Company, Detroit, Mich.

Infringing makers and those who buy from them are both equally liable in damages and both will be vigorously prosecuted.....

ERNEST F. LLOYD, Patentee,

DETROIT, MICH., March 27, 1905.

MUELLER GAS MAIN TAPPING MACHINES.

SWIVEL No. 1 MACHINE.

C—1004.

Some tapping machines can be operated well enough in some positions, but not in others, because they lack conveniences for adjustment.

On Mueller Swivel Tapping Machines the feed screw support or gooseneck has the convenience of adjustment to any angle. They can be used as well in one position as another.

Mueller Gas Main Tapping Machines are made in seven different styles for different classes of work, and make taps from ⅜ to 3-inch in any size of pipe. The machine illustrated is Mueller Swivel No. 1, which makes taps from ⅜ to 2-inch in pipes from 4 inches to the largest.

Each cock is carefully inspected and assembled, is given a working test, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make a full line of gas cocks and meter connections for gas works' use. Catalogues upon application.

EASTERN DIVISION—Located at 254-258 Canal Street (cor. Elm), New York City, carries a full stock of Mueller goods.

THREE GRAND PRIZES were awarded Mueller Water, Gas and Plumbing goods, respectively, at St. Louis.

H. MUELLER MFG. CO.,

DECATUR, ILLS., U. S. A. **NEW YORK, N. Y., U. S. A.**

ROOTS' GAS EXHAUSTERS.

GOLD MEDAL AT ST. LOUIS, 1904.

Installation showing our latest improved machines, with flexible rope coupling, for large units.

SEND FOR CATALOGUE.

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Building.

ARTHUR E. BOARDMAN, C.E.,

For several years associated with the late

CAPTAIN WILLIAM HENRY WHITE,

WILL CONTINUE THE BUSINESS OF

CONSULTING ENGINEER

For Gas, Water and Electric Light Companies, at

No. 41 Wall Street, Room 1707, New York.

TELEPHONE, 5534 BROAD.

FRANK D. MOSES,

Telephone, 204-A TRENTON, N. J., Telephone, 204-A

Constructing Engineer and Contractor.

Estimates Furnished on any kind of Work in Connection with Gas or Water Plants.

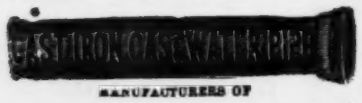
SPECIAL ATTENTION GIVEN TO THE REMODELLING AND EXTENDING OF THE PROPERTIES OF WORKS NOT UP-TO-DATE.

CORRESPONDENCE SOLICITED.

GEORGE ORMROD, Mangr. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.



MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

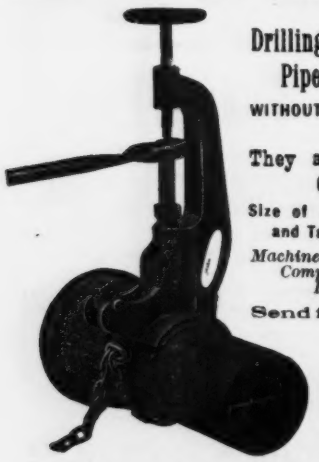
WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.



Geo. Light,
DAYTON, O.

GEORGE R. ROWLAND,
Formerly with the Continental Iron Works.
Draughtsman and Constructing Engineer.
Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.
Office, No. 245 Broadway, N. Y. City.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.
Plans prepared and Estimates furnished at short notice.
J. P. WHITTIER,
238 Java Street, Brooklyn, N. Y.

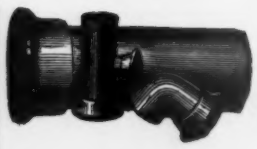
FREDERIC EGNER,
Gas Engineer,
NORFOLK, VA.,
May be consulted with reference to estimates of cost for new, or appraising actual value of existing works; utility of proposed or patented processes; relative earning power to capitalization, and management.

J. F. W. JOST,
CHEMICAL ENGINEER
—IN—
GAS MANUFACTURE,
P. O. BOX 2043. PHILADELPHIA, PA.

Do You Wish to Know
what size of pipe to use to convey any quantity of gas, any distance, with any loss of pressure and any initial or final pressure? Then use
Cox's Gas Flow Computer,
as it gives this information accurately at sight, without mental effort. No calculations needed. Saves time, money and mistakes.

Price, 6.5 x 8 inches, in cloth case, $2.50.
For sale by
A. M. Callender & Co., 42 Pine St., N. Y.

WARREN FOUNDRY AND MACHINE CO.,
Established 1856. Works at Phillipsburgh, N. J.
New York Office, 160 Broadway.

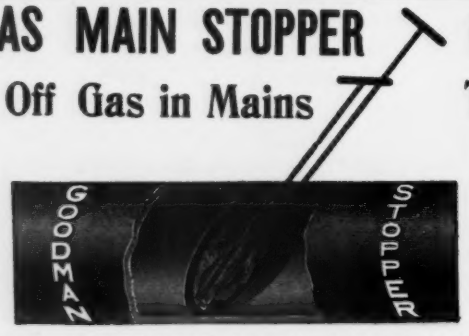


CAST IRON WATER AND GAS PIPE,
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF
Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

CHARLES MILLAR & SON CO., Selling Agents, Utica, N.Y.
Flanged Pipe and Fittings, Hydrants, Gates, Pig Lead, Jute, etc
UTICA PIPE FOUNDRY CO.
Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.
CAST IRON PIPE and SPECIALS FOR WATER AND GAS.
Wholesale Eastern Agents AKRON VITRIFIED SEWER PIPE.

SAFETY GAS MAIN STOPPER COMPANY,
For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



Temporarily during alterations and repairs. : : : :
STOPPERS SENT ON TRIAL.
Address: SAFETY GAS MAIN STOPPER CO., 1668 Park Ave., New York City.

FOX HILL FOUNDRY,
F. FERGUSON & SON,
HOBOKEN, N. J.
FINE OPENING
GRATE BARS
FOR GAS WORKS.
STATIONARY, SHAKING, DUMPING.
BARS FOR HAZELTON BOILERS.

LINK-BELT
OPEN TOP CARRIER.
ESPECIALLY ADAPTED FOR HANDLING
Coal, Coke, Ashes, Stone, Ores,
Or any heavy or gritty materials, where strength and durability are essential. Constructed in any length or capacity, and to suit local conditions.
WRITE FOR CATALOG
The Link-Belt Machinery Co.
Link-Belt Engineering Co. Philadelphia Chicago USA

GAS ANALYST'S MANUAL,
By JAQUES ABADY, M. Inst. Mech. E.
(Incorporating F. W. Hartley's "Gas Analyst's Manual" and "Gas Measurement.")
Ninety-three Illustrations and Nine Folding Plates. Bound in Handsome Half Leather. Price, $6.50.
For Sale by A. M. CALLENDER & Co., 42 Pine St., New York City.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

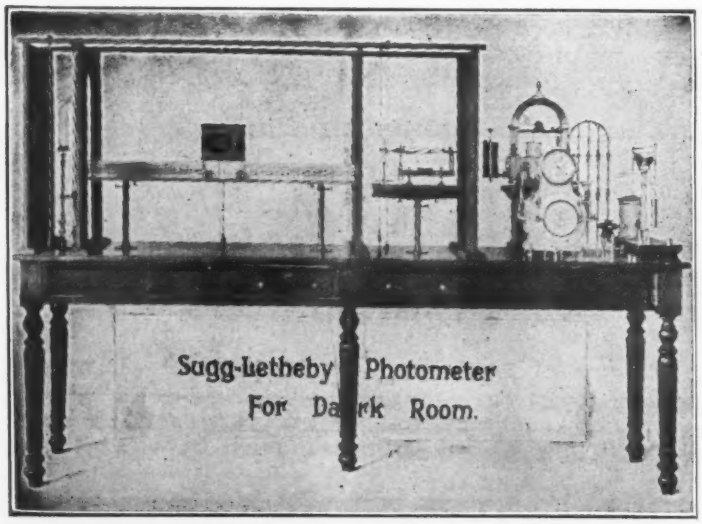
MAY, 1905.

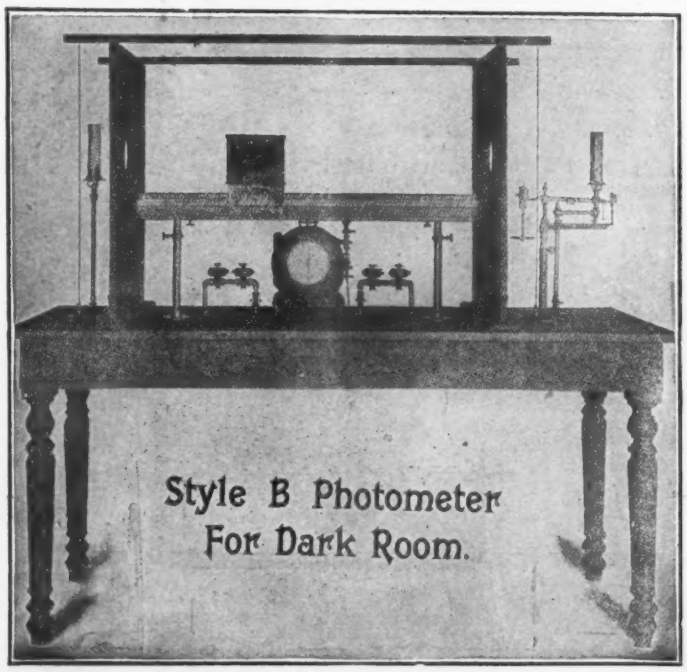
Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Mon.	1	7.30 PM	4.00 AM
Tue.	2	7.30	4.00
Wed.	3	7.30	4.00
Thu.	4	7.30 NM	4.00
Fri.	5	7.30	4.00
Sat.	6	7.30	4.00
Sun.	7	7.30	3.50
Mon.	8	7.30	3.50
Tue.	9	10.30	3.50
Wed.	10	11.20	3.50
Thu.	11	12.00 FQ	3.50
Fri.	12	12.40 AM	3.50
Sat.	13	1.10	3.50
Sun	14	1.50	3.40
Mon.	15	2.30	3.40
Tue.	16	3.10	3.40
Wed.	17	No L.	No L.
Thu.	18	No L. FM	No L.
Fri.	19	No L.	No L.
Sat.	20	7.40 PM	10.10 PM
Sun.	21	7.50	11.10
Mon.	22	7.50	12.00
Tue.	23	7.50	12.40 AM
Wed.	24	7.50	1.20
Thu.	25	7.50 LQ	1.50
Fri.	26	7.50	2.20
Sat.	27	7.50	2.50
Sun.	28	7.50	3.20
Mon.	29	7.50	3.30
Tue.	30	7.50	3.30
Wed.	31	7.50	3.30

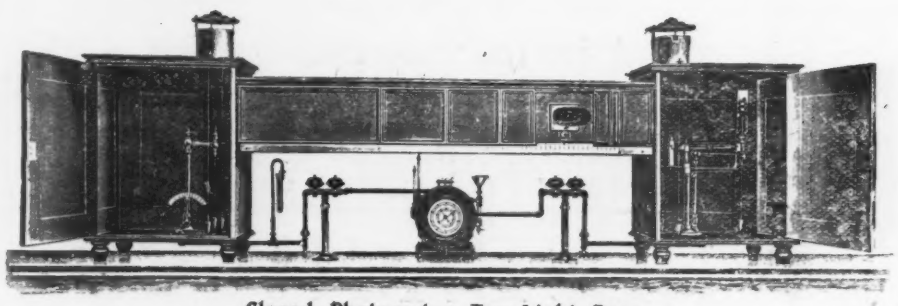
TOTAL HOURS DURING 1905.

By Table No. 1.

	Hrs.Min.
January	240.50
February	192.20
March	207.00
April	175.10
May	161.00
June	139.50
July	149.00
August	161.50
September	173.00
October	205.00
November	211.00
December	229.00
Total, yr.	2245.00







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

MAY, 1905.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. All Night Lighting. Light.	Extinguish.
		P.M.	A.M.
Mon.	1	6.45	4.00
Tue.	2	6.45	4.00
Wed.	3	6.45	4.00
Thu.	4	6.45	4.00
Fri.	5	6.45	4.00
Sat.	6	6.45	4.00
Sun.	7	6.55	3.40
Mon.	8	6.55	3.40
Tue.	9	6.55	3.40
Wed.	10	6.55	3.40
Thu.	11	6.55	3.40
Fri.	12	6.55	3.40
Sat.	13	6.55	3.40
Sun.	14	7.00	3.30
Mon.	15	7.00	3.30
Tue.	16	7.00	3.30
Wed.	17	7.00	3.30
Thu.	18	7.00	3.30
Fri.	19	7.00	3.30
Sat.	20	7.00	3.30
Sun.	21	7.10	3.15
Mon.	22	7.10	3.15
Tue.	23	7.10	3.15
Wed.	24	7.10	3.15
Thu.	25	7.10	3.15
Fri.	26	7.10	3.15
Sat.	27	7.10	3.15
Sun.	28	7.15	3.15
Mon.	29	7.15	3.15
Tue.	30	7.15	3.15
Wed.	31	7.15	3.15

TOTAL HOURS DURING 1905.

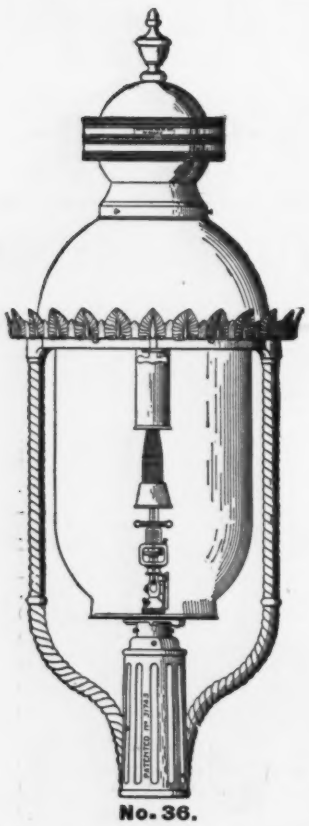
By Table No. 2.

	Hrs.Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 9 Libert Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple---

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

WELSBACH CO.,

Broad and Arch Sts., PHILADELPHIA.

THE UNITED GAS IMPROVEMENT COMPANY

For the Year Ending December 31st, 1904, has been Awarded Contracts for 45 Sets of

Standard Double-Superheater Lowe Water Gas Apparatus.

PARTIAL LIST OF PLACES:

Harrisburg, Pa.
Pelham, N. Y.
Reading, Pa.
Augusta, Me.
Bangor, Pa.
Woonsocket, R. I. (2d contract).
Brooklyn, N. Y. (4th contract).
Cincinnati, O. (2d contract).
Scranton, Pa. (3d contract).
New York City (14th contract).
New Haven, Conn. (2d contract).
Watertown, N. Y.
Tampa, Fla. (3d contract).
Westchester, N. Y. (3d contract).
Bridgeport, Conn. (2d contract.)
St. Paul, Minn. (2d contract).
Springfield, Mass. (2d contract).
Lynn, Mass. (5th contract).
Rochester, N. Y.
Battle Creek, Mich.
Mechanicsburg, Pa.
Excelsior Springs, Mo.
Bristol, Conn.
Jersey Shore, Pa.
Vicksburg, Miss.

TOTAL SETS, 1904, ... 45
TOTAL DAILY CAPACITY, 1904, ... 56,325,000 cubic feet.
TOTAL SETS TO DATE, ... 553
TOTAL DAILY CAPACITY, ... 419,180,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

OFFICE AND WORKS:
88 VAN DYKE ST., BROOKLYN, N. Y.
MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

NATIONAL PYROGRANIT COMPANY,

MANUFACTURERS OF

Fire Brick, Tiles,
Special Shapes, etc.

NEW YORK OFFICE:
17 Battery Place, New York.

WORKS:
South River, N. J.

DAVID LEAVITT HOUGH,

Consulting Engineer

AND

CONTRACTOR,

PARK ROW BUILDING, N. Y.

Established 1846.

Adam Weber Sons.

Manhattan Fire Brick and Enameled Clay Retort Works.

Works at Weber, on the Raritan River, Middlesex County, N. J.

GENERAL OFFICES: Park Row Bldg., N. Y. City.

ERECTION OF

Modern Coal Gas Plants,

With either Horizontal or Inclined Retorts, Half-Depth and Full-Depth Recuperative Furnaces, Adam Weber Patents.

MODERN BENCH IRONWORK.

Linings for Water Gas Apparatus, High Grade Fire Brick of All Descriptions, Ground Fire Clay, Ground Fire Brick in Bulk or Barrels.

ISAAC C. BAXTER, President.
Works.
LOCKPORT STATION, PA.

ESTABLISHED 1864.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

PETER YOUNG, Secretary and Treas.
Address all communications to
JAMES GARDNER, JR., CO., Room 202 Lewis Bldg.,
PITTSBURG, PA.

Fire Clay Goods for Gas Works.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y.

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. BLOOMINGTON, INDIANA.
In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD, BLOOMINGTON, IND.

For orders East of Buffalo, N. Y., or Pittsburg, Pa., freight will be paid to these points.

THE ECONOMICAL
GAS APPARATUS CONSTRUCTION
COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

PLANS,
SPECIFICATIONS
AND ESTIMATES
PREPARED.

AMERICAN OFFICE:
269 Front St., East, Toronto, Canada.

THEO. J. SMITH, Prest. J. A. TAYLOR, Sec
A. LAMBLA, Vice-Prest. and Supt.

BALTIMORE

RETORT & FIRE BRICK CO.

MANUFACTORY AT

LOCUST POINT, BALTIMORE, MD.

Clay Retorts, Blocks & Tiles

FIRE BRICK, FIRE CLAY,
AND FIRE CEMENT.

Our Improved Half and Full Depth Benches have been Adopted by Many Gas Companies.

WALDO BROS., 102 MILK ST., BOSTON, MASS.

Sole Agents for New England States.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office:
411 Olive Street,
Continental Bank,
ST. LOUIS, MO.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

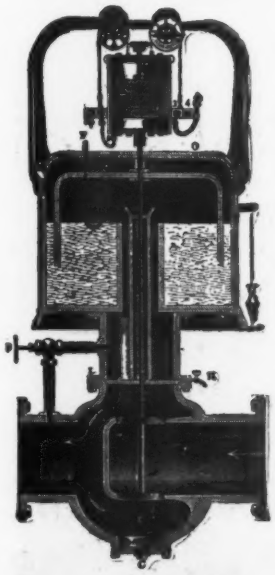
Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.

G. A. BRONDER,

Contracting Engineer and Builder,

229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



Design, Construction and Extension of

COAL OR WATER GAS PLANTS,

Automatic, Balance, High Pressure and Service Governors,

Roots Improved Gas Exhausters,

Iron Sponge, Purifying Material for Gas Purification Jones Jet Photometers Pressure Registers, etc.,

INSTALLATION OF SMOKELESS TAR BURNING SYSTEM,

Reinforced Concrete Construction for all Purposes,

Wide Experience in High Pressure Installation and Extension,

GAS SPECIALTIES.

395 Broadway, NEW YORK. **295 West 22d Street, CHICAGO, ILLS.**

ARTHUR R. CRUSE, President. FRANK FLAVELL, Secretary. AARON E. KEMPER, Treasurer.

Cruse=Kemper Company,

PHILADELPHIA OFFICES: Stephen Girard Building. - - WORKS: Ambler, Pa.

Manufacturers of

Triple, Double and Single=Lift Gasholders,

With or Without Metal Tanks,

Oil and Water Tanks, Purifier Covers, General Plate Metal Work, and Steel Water Towers.

Plans, Specifications and Estimates Promptly Furnished on Request.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

Practical Photometry,

By William Joseph Dibdin.

Price, - - - - $3.00.

FOR SALE BY

A. M. CALLENDER & CO.,

42 Pine St., New York City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

THE PERKINS COMPANY,

228 and 229 Produce Exchange, New York City.

Ocean Mine Youghiogheny Gas Coal,
Old Kentucky Shale and O. K. Boghead.

SHIPMENTS FROM NEW YORK, PHILADELPHIA, BALTIMORE AND NORFOLK.

BERWIND-WHITE COAL MINING COMPANY'S

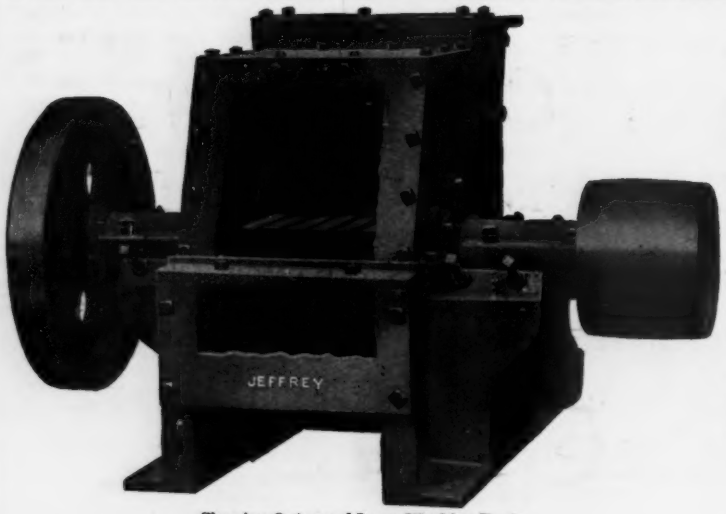
Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming. .

A. C. M. AZOY, General Agent, 1 Broadway, New York.

WE ARE READY
TO DEMONSTRATE THE SUPERIORITY
OF
JEFFREY PULVERIZERS



Showing Outer and Inner Working Parts.

By
FREE CRUSHING TESTS.

A Few Strong FEATURES:

Accessibility of Working Parts.

Substantial Pillow Blocks.

Material Partly Crushed in Suspension.

Simplicity in Changes of Parts.

Catalogue No. 30 contains full information. Mailed free with others on

ELEVATING-CONVEYING, POWER-TRANSMITTING.

THE JEFFREY MFG. CO., COLUMBUS, OHIO, U. S. A.
New York, Pittsburg, Chicago, Denver, Charleston, W. Va.

BINDER for the JOURNAL.

Price, $1.00.

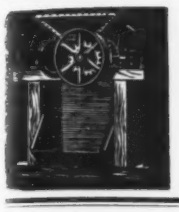
A. M. CALLENDER & CO., 42 Pine Street, N.Y.

SELF-INSTRUCTION
For Students in Gas Manufacture.

Price, $1.25. For Sale by
A. M. Callender & Co.,
42 Pine Street, New York City.

FRED. BREDEL, President. WM. O. VILTER, Vice-President. O. W. GREENSLADE, Secretary and Treasurer.

FRED. BREDEL COMPANY,
ENGINEERS AND BUILDERS OF GAS PLANTS.
Inclined Benches, own system, Recuperative Furnaces, Exhausters, Exhauster Governors, Condensers, Washers, Coolers, Wet Purifying Plants, Purifiers, Oxide Elevators, Hydraulic and Dry Coke Conveyors.
Special High Grade Material for Recuperative Furnaces.
Licensees for ARROLL-FOULIS Charging and Discharging Machines and FRONHAUSER Coke Conveyors. **OFFICE, 405 KEENE ST., MILWAUKEE, WIS.**



KELLER ADJUSTABLE COKE CRUSHER.

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,
Sec. & Supt. Gas Lt. & Coke Co.,
Columbus, Ind.
Correspondence Solicited.

BAXTER & YOUNG,

CONTRACTING AND CONSULTING GAS ENGINEERS.

Examination and Values Ascertained of Artificial and Natural Gas Properties.

COMPLETE GAS WORKS ERECTED.

Artificial and Natural Gas Mains Furnished and Laid.

GAS PROPERTIES PURCHASED.

OFFICE: WAYNE COUNTY BANK BUILDING,
Rooms 201 & 202. DETROIT, MICH.

Geo. Shepard Page's Sons.

GAS MACHINERY.

Correspondence Solicited.

180 Fulton Street, New York City.

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 cents. Orders may be sent to

A. M. CALLENDER & CO., 42 PINE ST., N. Y CITY.

POOLE ON FUELS.

THE CALORIFIC POWER OF FUELS.

By HERMAN POOLE, F.C.S.

Second Edition. Price, $3. For Sale by

A. M. CALLENDER & CO., 42 PINE ST, N.Y. CITY.

EDMUND H. McCULLOUGH, President. CHAS. F. GODSHALL, Treasurer. H. C. ADAMS, Secretary. HENRY WHARTON, Assistant Secretary

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J., WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

SUN COMPANY,

PRODUCER, REFINER, SHIPPER AND EXPORTER OF Petroleum and All Its Products.

Pittsburg, Pa., and Philadelphia, Pa.

THE SUN OIL CO.

Gas Oil, Gas Naphtha,
Refined Oil, Lubricating Oils.

Toledo, O., and Pittsburg, Pa.

BROWNHOIST CRANES

FOR LIFTING PURIFIER COVERS IN GAS HOUSES.

WRITE FOR PARTICULARS.

The Brown Hoisting Machinery Co.,
1436 St. Clair Street, Cleveland, O.
217 Havemeyer Building, New York.

PRACTICAL HANDBOOK ON

GAS ENGINES,

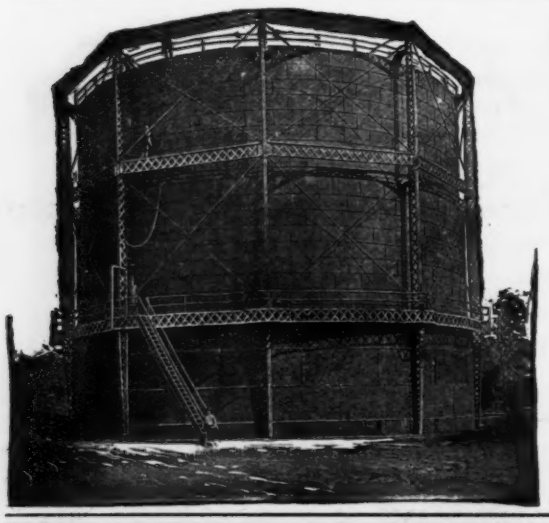
With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author, GEO. M. RICHMOND, M.E.

PRICE, $1.00.

A. M. CALLENDER & CO., 42 Pine Street, New York City.



DAVIS & FARNUM MFG. CO.,

Principal Office and Works, Waltham, Mass.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

Coke Barrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

USE YOUR OWN

JUDGMENT.

We can send you scores of testimonials from customers, but if you are not yet using our attachments we will send you a sample, free. Try it. If not the **BEST** you have ever used, we will not expect your trade. :: :: :: :: :: :: Long warning to consumers, entirely preventing fatal accidents. Other important features.

REEVES MFG. CO., - - - - - New Haven, Conn.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS AND STEEL TANKS,

Latest Improved

ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

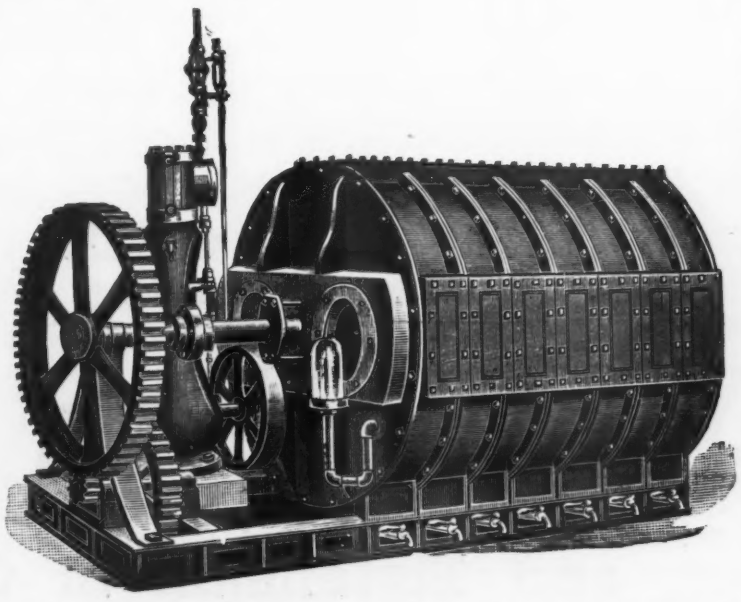
ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, {FORT WAYNE, IND.

BARTLETT, HAYWARD & CO.

BALTIMORE, MD.

Designers and Builders of Gas Works.



Sole Lessees the Wilkinson Water Gas Process.

PATENT STANDARD WASHER-SCRUBBER.

The best apparatus for the extraction of all Ammonia and a large proportion of Carbonic Acid and Sulphureted Hydrogen. The Scrubber has been materially improved and is provided with patented Wooden Segmental Grids, instead of Metallic Discs, thus reducing the weight on shaft and power for operating same.

Coal and Water Gas Installations of the Most Modern and Complete Types.

BENCHES WITH INCLINED RETORTS.

System Stettiner Chamotte Fabrik, Actien Gesellschaft, of Stettin, Germany.

GASHOLDERS OF ALL SIZES.

General Western Agents, THE LLOYD CONSTRUCTION CO., of Detroit, Mich.

QUINTARD IRON WORKS,

N. F. PALMER,

Foot of 12th St. & East River, New York,

MANUFACTURERS OF

GAS APPARATUS.

Complete Works Erected.

FREDERICK W. FLOYD, Engineer.

ALEX. C. HUMPHREYS, M.E., M. Inst. C.E. ARTHUR G. GLASGOW, M.E., M. Inst. C.E.

HUMPHREYS & GLASGOW,

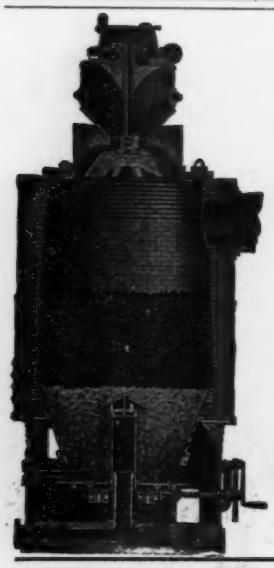
CONSULTING ENGINEERS.

BANK OF COMMERCE BLDG., 31 Nassau Street, New York.

38 VICTORIA STREET, London S.W., England.

ADVICE AS TO EXTENSION AND RECONSTRUCTION OF GAS AND ELECTRICITY PLANT.

COMPLETE EXAMINATIONS MADE. PROPERTIES PURCHASED.



R. D. WOOD & CO.,

400 CHESTNUT STREET, PHILADELPHIA

—BUILDERS OF—

Gas Power Plants with Producers.

The best Producers for either Bituminous, Anthracite Coal or Lignite. Less labor required and less waste than in any other Producer. Send for Pamphlet. : : : :

CAST IRON PIPE.

HYDRAULIC TOOLS. HYDRAULIC OPERATING VALVES.

J. S. DE HART, JR., President. R. K. WEHNER, Treasurer. A. F. WEHNER, Secretary

ISBELL-PORTER CO.,

ENGINEERS AND CONTRACTORS FOR THE

Construction and Extension of Gas Works.

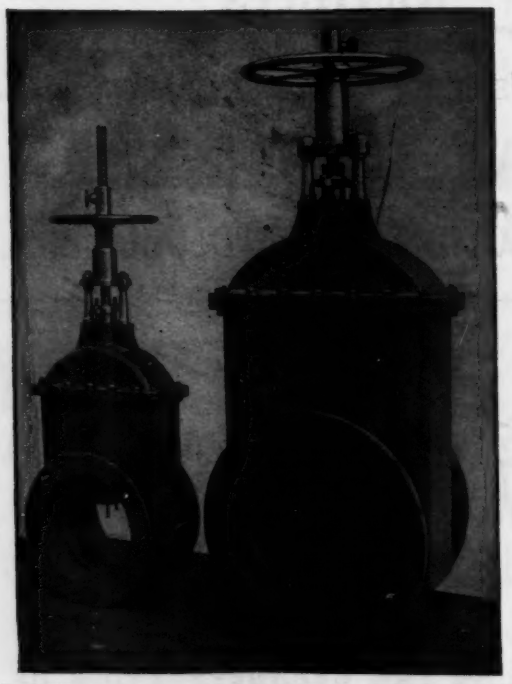
TOTAL ROTARY AMMONIA SCRUBBERS SOLD:

129,556,000 Cubic Feet Daily Capacity.

TOTAL WALKER TYPE TAR EXTRACTORS SOLD:

40,100,000 Cubic Feet Daily Capacity.

OFFICE AND WORKS: Bridge and Ogden Streets, Newark, N. J.



Double Gate Valves.

A LARGE STOCK ON HAND READY FOR PROMPT SHIPMENT.

These valves are provided with double discs or gates, and are tight with the gas pressure on either side of them.

The discs are so arranged as to be free from their seats when being opened or closed, and are operated by a quick-acting mechanism. The valve stem extends outside of the bonnet, and serves as an index, showing whether the valve is closed or open, and the amount of opening. They are made of the following dimensions:

Size.	8 Inches.	10 Inches.	12 Inches	16 Inches.	20 Inches.	24 Inches	30 Inches.	36 Inches.
Diameter of flanges.....	13 inches	16 inches.	18 inches	22½ inches	27 inches.	31 inches.	37½ inches	44 inches.
Face to face of flange...	12 inches.	12 inches.	12 inches	14 inches	17 inches	20 inches	21 inches.	23½ inches.

For price and other information, apply to

THE CONTINENTAL IRON WORKS,

NEW YORK (BOROUGH OF BROOKLYN).

P. O. STATION G.

Directory of American Gas Companies, 1904.

Price. $5.00.

For Sale by

A. M. Callender & Co., 42 Pine St., N. Y.

THE STACEY MANUFACTURING COMPANY,

MANUFACTURERS AND BUILDERS OF

GASHOLDERS AND STEEL TANKS

OF ANY SIZE AND DESCRIPTION,

AND ALL IRONWORK AND MACHINERY REQUIRED IN A GAS PLANT

Also Oil Storage Tanks, Steel Roofs, Stand Pipes, Etc.

We also manufacture Lamp Posts, Gas Valves, all size and shape Castings, Etc.

Makers of Apparatus for THE CHOLLAR PROCESS OF PURIFICATION.

Plans, Specifications and Estimates Cheerfully Furnished on Request.

GENERAL OFFICES AND WROUGHT IRON WORKS:
Elmwood Place, Ohio. 'Phone, "Park 384."

FOUNDRY AND CAST IRON WORKS:
No. 239 Mill Street, CINCINNATI, OHIO. 'Phone, "West 690."

RITER-CONLEY COMPANY,

GASHOLDERS, with or without Steel Tanks.

Purifiers, Condensers, Scrubbers, Oil Tanks, Smoke Stacks.

STEEL ROOFS and BUILDINGS.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

GENERAL OFFICE: Pittsburg, Pa. EASTERN OFFICE: 39-41 Cortlandt St., New York City.

J. ALEX. MAYERS,

No. 56 PINE ST., · · NEW YORK CITY,

GAS ENGINEER AND CONTRACTOR

FOR THE ERECTION OF

COMPLETE GAS WORKS

OR ANY PART THEREOF.

CORRESPONDENCE PROMPTLY ANSWERED.

PRACTICAL PHOTOMETRY,

By WILLIAM JOSEPH DIBDIN,

PRICE, $3. FOR SALE BY

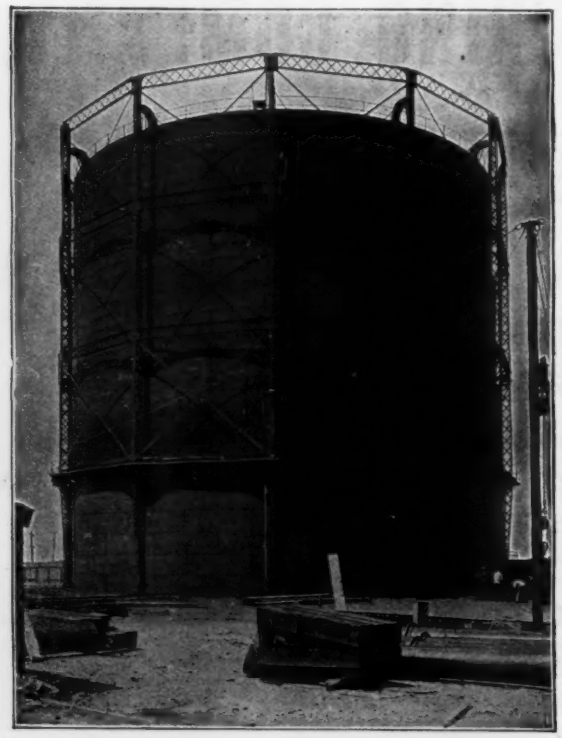
A. M. CALLENDER & CO., 42 Pine Street, New York City.

The Gas Engineer's Laboratory Handbook,

By JOHN HORNBY, F.I.C.

Price, $2.50.

A. M. CALLENDER & CO., 42 Pine St., N. Y. City.



Deily & Fowler,

39 Laurel Street, Philadelphia, Pa.

(ESTABLISHED 1842),

BUILDERS OF

GASHOLDERS,

Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.

The order for this Triple-Lift Holder and Steel Tank was received by the Logan Iron Works from the Union Gas Light Company, of East New York. The contract was completed and the Holder was in actual use in 90 days from receipt of order. Capacity of Holder, 500,000 cu. ft.

LOGAN IRON WORKS,

Brooklyn, N. Y.,

MANUFACTURERS OF

Single or Multiple-Lift

GASHOLDERS,

Complete, with Steel Tanks.

BENCHES, SCRUBBERS,
CONDENSERS,
PURIFIERS, IRON ROOFS,

AND ALL PARTS OF

GAS WORKS APPARATUS.

Contractors for
Complete Works.

Newbigging's Handbook for Gas Engineers and Managers.

PRICE, $6.50.

A. M. CALLENDER & CO., 42 Pine Street, New York City.

Established 1854.

D. McDONALD & CO.,

MANUFACTURERS OF

WET AND DRY METERS, STATION METERS AND METER PROVERS.

ALSO MAKERS OF

THE GLOVER PREPAYMENT METER.

The amount of gas delivered for the coin can be instantly and positively changed without removing the meter or replacing any parts.

The gas registered agrees absolutely with the amount purchased by the coin.

WE HAVE MADE AND SOLD IN THE UNITED STATES

OVER 120,000 OF THESE METERS,

ALL OF WHICH ARE GIVING PERFECT SATISFACTION.

Correspondence Solicited.

561 West Forty-seventh Street, NEW YORK. | 51, 53 & 55 Lancaster Street, ALBANY, N. Y. | Jefferson and Monroe Streets, CHICAGO.

LARGE CAPACITY

GAS METERS

The Kind You Want

PITTSBURGH METER COMPANY

PITTSBURGH, PA.

We Have Sold Over 50,000 of Our

PREPAYMENT GAS METERS

IN NEW ENGLAND.

We Have Fitted Up Over 10,000 Idle Regular Meters with Our

PREPAYMENT ATTACHMENT.

Can be Attached to Any Make of Meter.

NATHANIEL TUFTS METER COMPANY, 8 MEDFORD STREET, BOSTON, MASS.

MARYLAND METER CO.,

BALTIMORE, North and Saratoga Streets. CHICAGO, 88 to 92 Jackson Boulevard.

CONSUMERS' AND STATION METERS, PRESSURE GAUGES, ETC.

SPECIAL ATTENTION GIVEN TO ALL REPAIR WORK.

"Have you Seen our Complaint Meter?"

WHEN YOU SEND REPAIRS TO US

They can be changed to Prepayment, Prepayment and Beal Straight reading, or Beal Staight-reading only. Good job. Good time. Good people. Write us.

KEYSTONE METER CO., Royersford, Pa.

DETROIT STOVE WORKS

"Largest Stove Plant in the World"

MANUFACTURES AND SELLS

DETROIT JEWEL GAS APPLIANCES

FOR COOKING and HEATING,

All about which is told in a fine and strictly "to-the-point" catalog, sent upon request to Gas Companies.

DETROIT, MICH. CHICAGO, ILLS.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers,
Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. 1339 to 1349 Cherry Street, Philadelphia, Pa.

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

EXCERPTS FROM DECISIONS

—OF THE—

BOARD OF GAS COMMISSIONERS of the COMMONWEALTH OF MASSACHUSETTS.

MR. E. H. YORKE, NEW HAVEN, CONN., Dec. 1, 1898.

Dear Sir: I am in receipt of a copy of "Excerpts from the Decisions of the Board of Gas Commissioners," which is a handy compilation in book form of extracts from the most recent decisions of the Gas Commission of Massachusetts.

I note that most of these extracts are broad and safe-guiding precepts, which apply with equal force to one Company as to another. The 13 years' existence of the Board of Gas Commissioners, with its unusual opportunities for acquiring information, have justly made it a high and safe authority in all matters pertaining to the management, obligations and rights of Gas Companies. Your little book will serve as a valuable reference library in settling legal complications which often arise between a Gas Company and its customers.

Yours truly, (Signed) F. C. SHERMAN, Superintendent.

☞ A 28-page Pamphlet, containing the cream of this Board's decisions as to the proper management of Gas Companies.

Compiled by E. H. YORKE. Price, $1.00. Address,

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

BEFORE.

This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,

559 West 47th Street, NEW YORK.

PHILADELPHIA.

Jefferson and Monroe Streets, CHICAGO.

OVER 170,000 OF THE POSITIVE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES.

SEND FOR OUR BOOKLET.